

## **Steam Plants**

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1. (1.4.1-1) By which of the listed methods may heat be transferred from one body to another?

- ☐ (a) Radiation
- ☐ (b) Convection
- ☐ (c) Conduction
- ☒ (d) All of the above

*If choice d is selected set score to 1.*

2. (1.4.1-2) Which of the following statements is correct concerning heat transfer?

- ☐ (a) Heat is given off from a high temperature region known as a heat sink.
- ☐ (b) Heat transfer rate is affected most by the size of the heat sink involved.
- ☒ (c) Heat transfer rate is affected most by the temperature difference between the heat source and the heat sink.
- ☐ (d) Heat transfer by radiation will occur only by mass motion of a fluid substance.

*If choice c is selected set score to 1.*

3. (1.4.1-3) Which of the following modes of heat transfer does NOT require any physical contact between a warmer and a cooler substance?

- ☒ (a) Radiation
- ☐ (b) Conduction
- ☐ (c) Lamination
- ☐ (d) All of the above

*If choice a is selected set score to 1.*

4. (1.4.2-2) Auxiliary steam at full operating pressure is supplied from the boiler directly to the \_\_\_\_\_.

- ☐ (a) turbo generators
- ☐ (b) distilling plants
- ☐ (c) main air ejectors
- ☒ (d) soot blowers

*If choice d is selected set score to 1.*

5. (1.4.2-1) Which of the following statements is true concerning the piping system shown in the illustration? SG-0005

- ☐ (a) The boiler soot blowers operate with desuperheated steam.
- ☐ (b) Air ejectors operate on 143 psi steam.
- ☐ (c) The steam whistle operates on 140 psi steam.
- ☒ (d) All of the above.

*If choice d is selected set score to 1.*

6. (1.4.3.1-1) Precautions to be observed prior to starting a turbine driven feed pump, should include \_\_\_\_\_.

- (a) checking the manual trip device for proper operation
- (b) assuring that the turbine casing drains are wired closed
- (c) observing the operation of the over speed trip
- (d) open all governor oil relay drains

*If choice a is selected set score to 1.*

7. (1.4.3.1-3) An auxiliary turbine boiler feed pump should normally be stopped by \_\_\_\_\_.

- (a) closing the exhaust valve slightly
- (b) rotating the hand lube oil pump backwards
- (c) increasing the load on the driven unit
- (d) actuating the throttle hand tripping device

*If choice d is selected set score to 1.*

8. (1.4.3.1-5) The constant pressure governor of a turbine-driven feed pump maintains which of the following pressures at a constant value for all capacities?

- (a) Pump suction
- (b) Turbine inlet
- (c) Pump discharge
- (d) Turbine exhaust

*If choice c is selected set score to 1.*

9. (1.4.3.2-1) When starting a turbo generator in an automated plant, you must provide lube oil pressure to the unit by means of \_\_\_\_\_.

- (a) the hand operated or auxiliary lube oil pump
- (b) a line from the other generator
- (c) a line from the gravity tank
- (d) the main lube oil pump

*If choice a is selected set score to 1.*

10. (1.4.3.2-2) The safety device provided on a turbo generator which closes the throttle automatically when the cooling water to the condenser is insufficient is called a/an \_\_\_\_\_.

- (a) over speed trip
- (b) back pressure trip
- (c) low pressure trip
- (d) high temperature trip

*If choice b is selected set score to 1.*

**11.** (1.4.3.2-3) A back pressure trip on a ship's service turbo-generator functions to trip the turbine under what circumstance?

- ☐ (a) gland seal leakoff pressure is too high
- ☐ (b) lubricating oil pressure is too low
- ☒ (c) amount of cooling water to the condenser is insufficient
- ☐ (d) amount of cooling water to the condenser is excessive

*If choice c is selected set score to 1.*

**12.** (1.4.3.1-6) The over speed tripping device installed on an auxiliary turbine is automatically actuated by \_\_\_\_\_.

- ☐ (a) hydraulic pressure
- ☐ (b) high back pressure
- ☒ (c) centrifugal force
- ☐ (d) pneumatic force

*If choice c is selected set score to 1.*

**13.** (1.4.4.1-1) In which of the listed components is chemical energy converted to thermal energy with regards to boiler operation?

- ☐ (a) Superheater
- ☐ (b) Steam drum
- ☒ (c) Furnace
- ☐ (d) Economizer

*If choice c is selected set score to 1.*

**14.** (1.4.4.1-2) The purpose of a 'peep' hole in the boiler casing is to \_\_\_\_\_.

- ☐ (a) examine the condition of the refractory cones
- ☐ (b) check the operation of the soot blowers
- ☐ (c) check for excess smoke in the stack
- ☒ (d) examine the condition of the flame

*If choice d is selected set score to 1.*

**15.** (1.4.4.1-3) The steam drum in a D-type marine boiler \_\_\_\_\_.

- ☐ (a) maintains circulation by forcing steam bubbles downward in the generating tubes
- ☐ (b) acts as a receptacle for heavy suspended solids in boiler feed water
- ☐ (c) supports the superheater tube bank
- ☒ (d) provides a space for moisture to separate from the steam

*If choice d is selected set score to 1.*

**16.** (1.4.4.1-4) In a single furnace boiler, where is the steam typically cooled for use as auxiliary steam?

- ☐ (a) Condenser
- ☒ (b) Desuperheater
- ☐ (c) Superheater
- ☐ (d) Air ejector

*If choice b is selected set score to 1.*

**17.** (1.4.4.1-5) The main steam stop bypass valve is used to \_\_\_\_\_.

- ☐ (a) isolate the main steam stop for repairs while steaming
- ☒ (b) gradually increase the pressure and temperature of the main steam piping when warming up
- ☐ (c) cross-connect two steaming boilers
- ☐ (d) supply auxiliary steam when the main steam stop is closed

*If choice b is selected set score to 1.*

**18.** (1.4.4.2-1) The items labeled "C" and "L" as indicated on the illustration are commonly called \_\_\_\_\_. SG-0020

- ☐ (a) mica sheets
- ☒ (b) glass plate inserts
- ☐ (c) face plates
- ☐ (d) cork gaskets

*If choice b is selected set score to 1.*

**19.** (1.4.4.3-4) Which of the valves listed should be closed before lighting off a boiler?

- ☐ (a) Superheater vent valve
- ☐ (b) Superheater drain valve
- ☒ (c) Economizer drain valve
- ☐ (d) Air cock valve

*If choice c is selected set score to 1.*

**20.** (1.4.4.3-7) When raising steam on an idle boiler and the steam pressure has risen to about 5 pounds more than the pressure of the boiler already on the line, you can \_\_\_\_\_.

- ☐ (a) increase the boiler firing rate
- ☐ (b) close the superheater vent
- ☐ (c) close the air cock
- ☒ (d) put the boiler on the line

*If choice d is selected set score to 1.*

**21.** (1.4.4.3-8) Which of the following precautions should be taken prior to lighting off a boiler?

- (a) Purge the furnace of combustible gases.
- (b) Bottom blow the mud drum.
- (c) Close the air register.
- (d) Secure the main steam line drains.

*If choice a is selected set score to 1.*

**22.** (1.4.4.3-5) If a boiler is brought on the line with its steam pressure much higher than that of the boiler already on the line, there is danger of \_\_\_\_\_.

- (a) thermal shock
- (b) low water
- (c) an overloaded superheater
- (d) priming and carryover

*If choice d is selected set score to 1.*

**23.** (1.4.4.3-6) While raising steam on a cold boiler, the air cock is to be closed after \_\_\_\_\_.

- (a) the economizer drain is closed
- (b) steam has formed and all air is vented
- (c) all burners have been lit and firing normally
- (d) the boiler is cut in on the line

*If choice b is selected set score to 1.*

**24.** (1.4.4.3-1) Which of the following statements about boilers is correct?

- (a) Loss of water will not harm a boiler if the water level can be restored.
- (b) No boiler will continue to generate steam after the fires are secured.
- (c) The water level in a properly operated boiler will not shrink or swell.
- (d) A hot boiler will continue to generate steam after the fires are secured.

*If choice d is selected set score to 1.*

**25.** (1.4.4.3-2) When a boiler has been secured and is being initially cooled, the water level showing in the steam drum gage glass should be \_\_\_\_\_.

- (a) maintained at the normal level
- (b) maintained at a full glass
- (c) allowed to go out of sight
- (d) allowed to drop naturally

*If choice a is selected set score to 1.*

**26.** (1.4.4.3-3) After a boiler has been taken off the line and is cooling, the air cock is opened to \_\_\_\_\_.

- ☐ (a) purge all air from the steam drum
- ☒ (b) prevent the formation of a vacuum within the boiler
- ☐ (c) guard against entrapped gas pockets in the superheater
- ☐ (d) allow even cooling of the steam drum

*If choice b is selected set score to 1.*

**27.** (1.4.5-1) The auxiliary exhaust system shown in the illustration can be supplied by steam from the \_\_\_\_\_. SG-0024

- ☐ (a) distilling plant
- ☐ (b) turbo generators
- ☒ (c) IP bleed system
- ☐ (d) LP bleed system

*If choice c is selected set score to 1.*

**28.** (1.4.5-3) The primary source of steam to the auxiliary exhaust system is typically supplied directly from \_\_\_\_\_.

- ☐ (a) the main engine LP bleed
- ☒ (b) turbine driven and reciprocating steam pumps
- ☐ (c) the turbine gland exhaust system
- ☐ (d) all of the above

*If choice b is selected set score to 1.*

**29.** (1.4.5-6) The purpose of the steam control valves installed in the auxiliary exhaust line is to \_\_\_\_\_.

- ☐ (a) regulate back pressure in the desuperheater line
- ☐ (b) seal the vent condenser to prevent the escape of condensate
- ☒ (c) control steam admission and maintain the proper steam spray pattern in the DC heater
- ☐ (d) preheat the condensate before it enters the vent condenser

*If choice c is selected set score to 1.*

**30.** (1.4.5-5) Which of the components listed prevents water from flowing back into the auxiliary exhaust line if the deaerating feed tank becomes flooded?

- ☒ (a) Check valve
- ☐ (b) Reverse-acting relief valve
- ☐ (c) Pumps
- ☐ (d) Exhaust piping

*If choice a is selected set score to 1.*

**31.** (1.4.5-2) The primary objective of the auxiliary exhaust system is to supply steam to the \_\_\_\_\_.

- ☐ (a) main condenser
- ☐ (b) main feed pumps
- ☐ (c) soot blowers
- ☒ (d) deaerating feed tank

*If choice d is selected set score to 1.*

**32.** (1.4.5-4) If the pressure becomes excessive in the auxiliary exhaust system of a steam propulsion plant, the excess steam will normally be dumped to the \_\_\_\_\_.

- ☒ (a) main condenser
- ☐ (b) vent condenser
- ☐ (c) deaerating feed tank
- ☐ (d) reduced steam system

*If choice a is selected set score to 1.*

**33.** (1.4.5-7) The intermediate pressure bleed steam system, shown in the illustration, is used to supply steam at approximately \_\_\_\_\_. SG-0024

- ☐ (a) 13.6 psig
- ☐ (b) 35.0 psig
- ☒ (c) 67.0 psig
- ☐ (d) 13.6 psia

*If choice c is selected set score to 1.*

**34.** (1.4.6.1-2) Air accumulated in the inter condenser of the air ejector assembly is discharged directly to the \_\_\_\_\_.

- ☐ (a) high pressure turbine
- ☐ (b) main condenser
- ☐ (c) atmosphere
- ☒ (d) after condenser

*If choice d is selected set score to 1.*

**35.** (1.4.6.1-7) While vacuum is being raised on the main unit and the turbine warmed, condensate is recirculated to the main condenser to \_\_\_\_\_.

- ☐ (a) cool the main condenser shell for better vacuum
- ☒ (b) ensure the condensation of air ejector steam
- ☐ (c) provide a condenser vacuum seal
- ☐ (d) maintain a proper DC heater water level

*If choice b is selected set score to 1.*



**36.** (1.4.6.1-4) The loop seal connected to the main condenser returns the drains from the \_\_\_\_\_.

- ☐ (a) vent condenser
- ☒ (b) inter condenser
- ☐ (c) after condenser
- ☐ (d) all of the above

*If choice b is selected set score to 1.*

**37.** (1.4.6.1-3) The cooling water flow from an air ejector inter condenser and after condenser is discharged directly into the \_\_\_\_\_.

- ☒ (a) condensate and feed system
- ☐ (b) main condenser hot well
- ☐ (c) atmospheric drain tank
- ☐ (d) auxiliary condenser hot well

*If choice a is selected set score to 1.*

**38.** (1.4.6.1-6) Main condensate recirculating systems are primarily intended to \_\_\_\_\_.

- ☐ (a) prevent excessive overheating of the condensate pumps
- ☐ (b) balance and control condensate temperatures at full load
- ☒ (c) provide adequate cooling water for the air ejector condensers
- ☐ (d) vent accumulated vapors from the condensate pump discharge

*If choice c is selected set score to 1.*

**39.** (1.4.6.1-1) Steam condensed in the air ejector inter condenser, drains to the \_\_\_\_\_.

- ☐ (a) atmospheric drain tank
- ☐ (b) vent condenser drain tank
- ☒ (c) main condenser through the loop seal
- ☐ (d) after condenser drain tank

*If choice c is selected set score to 1.*

**40.** (1.4.6.1-5) Which statement is true concerning two-stage air ejector assemblies?

- ☒ (a) The steam/air mixture from the main condenser is discharged by the first stage air ejector to the inter condenser.
- ☐ (b) Steam to the after condenser is condensed and returned to the main condenser via the loop seal.
- ☐ (c) Air is removed from the condensate as it passes through the tubes.
- ☐ (d) The first stage air ejector takes suction on the second stage to increase vacuum.

*If choice a is selected set score to 1.*

**41.** (1.4.6.2-3) Which statement listed represents a vital function of the main condenser?

- ☐ (a) Condensing of the exhaust steam from the main feed turbine pumps.
- ☐ (b) Cooling of the exhaust steam from the auxiliary exhaust system before it enters the deaerating feed tank.
- ☒ (c) The recovery of feed water for reuse.
- ☐ (d) Storage of feed water for immediate use in the boilers.

*If choice c is selected set score to 1.*

**42.** (1.4.6.2-6) A main condenser utilizing a scoop for the circulation of seawater must be constructed as a \_\_\_\_\_.

- ☐ (a) parallel flow heat exchanger
- ☐ (b) counterflow heat exchanger
- ☒ (c) single-pass heat exchanger
- ☐ (d) two-pass heat exchanger

*If choice c is selected set score to 1.*

**43.** (1.4.6.2-7) Water boxes on main condensers are vented to \_\_\_\_\_.

- ☒ (a) liberate air pockets and reduce waterside oxidation
- ☐ (b) prevent excessive pressure on tube sheets
- ☐ (c) provide a minimum condensate level in the hot well
- ☐ (d) prevent vapor binding of the circulating pump

*If choice a is selected set score to 1.*

**44.** (1.4.6.2-4) Which of the condensers listed is cooled by sea water?

- ☐ (a) Gland exhaust condenser
- ☐ (b) Air ejector condenser
- ☐ (c) Vent condenser
- ☒ (d) Main condenser

*If choice d is selected set score to 1.*

**45.** (1.4.6.2-2) Zincs are installed in the main and auxiliary condenser water boxes to \_\_\_\_\_.

- ☐ (a) prevent air pockets
- ☐ (b) prevent scaling
- ☐ (c) reduce turbulence
- ☒ (d) reduce the effects of electrolysis

*If choice d is selected set score to 1.*

**46.** (1.4.6.2-5) While underway, vacuum in the main condenser is primarily caused by the \_\_\_\_\_.

- ☐ (a) main air ejector
- ☒ (b) condensing of the exhausting steam
- ☐ (c) suction drawn by the condensate pump
- ☐ (d) after condenser loop seal

*If choice b is selected set score to 1.*

**47.** (1.4.6.2-8) Air in the main condenser is harmful because it will \_\_\_\_\_.

- ☐ (a) cause heat to be transferred too rapidly
- ☒ (b) decrease the vacuum in the main condenser
- ☐ (c) cause the turbine casing to warp and bow
- ☐ (d) decrease the turbine exhaust steam pressure

*If choice b is selected set score to 1.*

**48.** (1.4.6.2-1) Makeup feed water is brought into an operating closed feed system via the \_\_\_\_\_.

- ☐ (a) auxiliary feed pump
- ☐ (b) main feed pump
- ☒ (c) condenser vacuum drag line
- ☐ (d) feed booster pump

*If choice c is selected set score to 1.*

**49.** (1.4.6.3-1) Under normal conditions, the rate of heat transfer in a feed water heater is most greatly affected by the \_\_\_\_\_.

- ☐ (a) speed of the main feed pump
- ☐ (b) density of the feed water
- ☒ (c) temperature differential between the steam and feed water
- ☐ (d) pH of the feed water

*If choice c is selected set score to 1.*

**50.** (1.4.6.3-3) The items labeled "D" in the illustration are the \_\_\_\_\_. SG-0025

- ☐ (a) high pressure drain connections
- ☐ (b) low pressure steam supply connections
- ☒ (c) low pressure drain connections
- ☐ (d) low pressure vent connections

*If choice c is selected set score to 1.*

**51.** (1.4.6.3-4) The connections labeled "A" in the illustration, are used to \_\_\_\_\_. SG-0025

- ☐ (a) provide a point of admission for the steam air heater drains
- ☐ (b) drain condensate from the feed water heater to the main condenser
- ☐ (c) provide a point of admission for the L.P. bleed steam
- ☒ (d) maintain a vacuum in the shell of the feed water heater

*If choice d is selected set score to 1.*

**52.** (1.4.6.3-2) The unit shown in the illustration is used as the \_\_\_\_\_. SG-0025

- ☐ (a) flash evaporator salt water feed heater
- ☒ (b) combined low pressure feed heater
- ☐ (c) Butterworth feed heater
- ☐ (d) high pressure feed heater

*If choice b is selected set score to 1.*

**53.** (1.4.6.3-6) A slight vacuum is maintained in the shell of the first stage heater shown in the illustration. The primary reason for the vacuum is to \_\_\_\_\_. SG-0025

- ☐ (a) force the use of the main condenser as the drain cooler
- ☐ (b) provide a low pressure area to guarantee feed water flow to the heater
- ☒ (c) maintain a positive flow of steam as supplied by the main engine LP bleed system
- ☐ (d) avoid the necessity of having to use the condensate pumps

*If choice c is selected set score to 1.*

**54.** (1.4.6.3-7) Which of the following statements is correct concerning the operation of the level or drain regulator associated with the feed water heater shown in the illustration is correct? SG-0025

- ☐ (a) The regulator controls the volume of condensate leaving the gland exhaust condenser.
- ☐ (b) The regulator maintains the flow of steam into the first stage heater of this unit.
- ☒ (c) The regulator controls the level of condensate collected in the drain cooler section.
- ☐ (d) The regulator controls the flow rate of condensate leaving the feed water outlet.

*If choice c is selected set score to 1.*

**55.** (1.4.6.3-5) The upper section of the feed water heater indicated by "G" in the illustration is used as the \_\_\_\_\_. SG-0025

- ☐ (a) after condenser
- ☒ (b) first stage heater
- ☐ (c) gland exhaust condenser
- ☐ (d) drain cooler

*If choice b is selected set score to 1.*

**56.** (1.4.6.4-4) In the condensate system, the automatic recirculating valve can be actuated by the \_\_\_\_\_.

- ☐ (a) superheater steam flow
- ☐ (b) DC heater water level
- ☒ (c) condensate temperature
- ☐ (d) condensate pump discharge pressure

*If choice c is selected set score to 1.*

**57.** (1.4.6.4-5) What type of sensor is normally used with the automatic recirculating valve in the main condensate line?

- ☒ (a) Thermostatic
- ☐ (b) Preset electric timing sensor
- ☐ (c) Pressure
- ☐ (d) Continuity

*If choice a is selected set score to 1.*

**58.** (1.4.6.4-6) The automatic recirculating valve in the main condensate recirculating line is controlled by a temperature sensor which is located at the \_\_\_\_\_.

- ☒ (a) air ejector condensate discharge
- ☐ (b) main condensate pump suction
- ☐ (c) main condensate pump discharge
- ☐ (d) condensate inlet to the main air ejectors

*If choice a is selected set score to 1.*

**59.** (1.4.6.4-1) High pressure and low pressure drain systems are part of the \_\_\_\_\_.

- ☐ (a) auxiliary turbine bleed system
- ☒ (b) condensate drain system
- ☐ (c) boiler drain system
- ☐ (d) contaminated drain system

*If choice b is selected set score to 1.*

**60.** (1.4.6.4-2) Clean low pressure steam drains are collected in the \_\_\_\_\_.

- ☐ (a) deaerating feed water heater
- ☐ (b) contaminated drain inspection tank
- ☒ (c) atmospheric drain tank
- ☐ (d) main condenser hot well

*If choice c is selected set score to 1.*

**61.** (1.4.6.5-4) In a main propulsion steam turbine installation, the condensate pump initially discharges to the \_\_\_\_\_.

- ☐ (a) distillate tank
- ☒ (b) air ejector condenser
- ☐ (c) deaerating feed tank
- ☐ (d) first stage heater

*If choice b is selected set score to 1.*

**62.** (1.4.6.5-2) Which of the pumps listed operates at constant speed and delivers water to the deaerating feed tank at a nearly constant pressure?

- ☒ (a) Main condensate pump
- ☐ (b) Main feed booster pump
- ☐ (c) Main circulating pump
- ☐ (d) Main feed pump

*If choice a is selected set score to 1.*

**63.** (1.4.6.5-1) The leakage of air into the pump casing by way of the packing gland of a condensate pump is prevented by \_\_\_\_\_.

- ☒ (a) a water seal line to the packing gland
- ☐ (b) an air seal line from the compressed air line
- ☐ (c) special packing in the stuffing box
- ☐ (d) the vacuum in the pump suction

*If choice a is selected set score to 1.*

**64.** (1.4.6.5-3) Condensate pumps have distinctly noticeable characteristics and can usually be recognized by their \_\_\_\_\_.

- ☐ (a) multiple impellers and pump shaft positions
- ☐ (b) speed-limiting governors and closed impellers
- ☐ (c) open impellers and power ends
- ☒ (d) large suction chambers and impeller eyes

*If choice d is selected set score to 1.*

**65.** (1.4.7.1-1) Condensate return lines from tank heating coils are led to the \_\_\_\_\_.

- ☐ (a) DC heater
- ☐ (b) atmospheric drain tank
- ☒ (c) contaminated drain system
- ☐ (d) main condenser

*If choice c is selected set score to 1.*

**66.** (1.4.7.1-2) Which statement is true concerning drain inspection tanks?

- (a) Inspection tanks provide for a visual examination of condensate which could be oil contaminated.
- (b) They collect condensate from the cargo tank heating coils only.
- (c) They are discharged to the condensate system just forward of the feed pump.
- (d) Inspection tanks collect all HP drains.

*If choice a is selected set score to 1.*

**67.** (1.4.7.1-3) If live steam is supplied directly to the tank heating coils, the collected drains in the 'clean' section of the contaminated drain inspection tank are removed directly to the \_\_\_\_\_.

- (a) atmospheric drain tank
- (b) main and/or auxiliary condenser
- (c) deaerating feed water heater
- (d) makeup feed water tank

*If choice a is selected set score to 1.*

**68.** (1.4.7.1-4) The purpose of a contaminated steam system is to \_\_\_\_\_.

- (a) ensure an uncontaminated source of feed for the makeup evaporator
- (b) distill water from a harbor
- (c) ensure fouled heating coil returns from fuel tanks do not contaminate boiler feed water
- (d) distill makeup feed for use as potable water

*If choice c is selected set score to 1.*

**69.** (1.4.8.1-4) As found in a reduction gear drive system, thrust bearings serve to \_\_\_\_\_.

- (a) limit the radial movement of the shaft
- (b) transmit the force produced by the propeller to the structure of the ship
- (c) hold the main engine in place
- (d) increase the shaft speed

*If choice b is selected set score to 1.*

**70.** (1.4.8.1-1) Babbitt is a metal alloy commonly used for lining \_\_\_\_\_.

- (a) shim stock
- (b) saltwater piping
- (c) valve seats
- (d) precision bearings

*If choice d is selected set score to 1.*

**71.** (1.4.8.1-2) Which of the following methods is used to securely fasten the Babbitt lining of a reduction gear bearing to its shell?

- ☐ (a) The Babbitt is relieved in way of the split and held in place by locking pins.
- ☐ (b) The Babbitt is securely bonded to the shell by the pressure of the hydrodynamic oil wedge.
- ☒ (c) The Babbitt is centrifugally spun into the bearings or cast under a pressure head.
- ☐ (d) The Babbitt has a crescent shaped pocket cast symmetrically about the bearing split.

*If choice c is selected set score to 1.*

**72.** (1.4.8.1-3) Which of the following types of bearings are used as line shaft bearings?

- ☒ (a) Ring-oiled, Babbitt-faced, spherical seat, shell
- ☐ (b) Rigidly mounted, radial sleeve
- ☐ (c) tapered roller, split type radial
- ☐ (d) Segmental, pivoted-shoe thrust

*If choice a is selected set score to 1.*

**73.** (1.4.8.2-1) Which of the devices listed is commonly used to compensate for the expansion and minor misalignments occurring between the main turbine rotor and the reduction gear?

- ☐ (a) Sliding sleeve
- ☐ (b) Quill shaft
- ☐ (c) Expansion gear
- ☒ (d) Gear type flexible coupling

*If choice d is selected set score to 1.*

**74.** (1.4.8.3-3) The component shown in the illustration, labeled "I", is the \_\_\_\_\_. SE-0013

- ☐ (a) first reduction pinion
- ☒ (b) first reduction gear
- ☐ (c) second reduction gear
- ☐ (d) second reduction pinion

*If choice b is selected set score to 1.*

**75.** (1.4.8.3-1) Which of the following methods is used to lubricate main propulsion turbine reduction gears?

- ☐ (a) Oil is pressure fed through internal drilled passages which force oil to the gear's periphery.
- ☐ (b) Oil rings in channels outside the gears dip into oil in the sump and carry it to the gear teeth.
- ☒ (c) Oil is sprayed through nozzles at the point of gear mesh.
- ☐ (d) The gears run through an open oil sump and oil is carried along on the gear teeth.

*If choice c is selected set score to 1.*



**76.** (1.4.8.3-2) The purpose of the main reduction gears is to \_\_\_\_\_.

- ☐ (a) reduce engine room noise levels during high speed operations
- ☐ (b) transmit vibration and thrust to the ship's hull
- ☒ (c) reduce high turbine RPM to an efficient propeller RPM
- ☐ (d) provide a means of reversing the main engines in an emergency

*If choice c is selected set score to 1.*

**77.** (1.4.8.3-4) The component shown in the illustration, labeled "IV", is the \_\_\_\_\_. SE-0013

- ☒ (a) bull gear
- ☐ (b) high speed pinion
- ☐ (c) low speed pinion
- ☐ (d) first reduction gear

*If choice a is selected set score to 1.*

**78.** (1.4.9.1-5) High pressure steam drains are normally discharged to the \_\_\_\_\_.

- ☐ (a) drain and inspection tank
- ☐ (b) reserve feed tank
- ☐ (c) atmospheric drain line
- ☒ (d) DC heater

*If choice d is selected set score to 1.*

**79.** (1.4.9.1-1) Why is it necessary to have a relief valve protecting the deaerating feed tank from internal pressure?

- ☒ (a) Because the tank receives high pressure drains.
- ☐ (b) Because the tank receives auxiliary exhaust.
- ☐ (c) Because the tank drains to the main condenser.
- ☐ (d) Because the tank receives large amounts of water.

*If choice a is selected set score to 1.*

**80.** (1.4.9.1-2) Which of the listed components would be considered the dividing line separating the condensate system from the feed water system?

- ☐ (a) Main condenser
- ☐ (b) Main air ejectors
- ☒ (c) Deaerating feed tank
- ☐ (d) Boiler drum

*If choice c is selected set score to 1.*

**81.** (1.4.9.1-3) The DC heater functions to \_\_\_\_\_.

- ☐ (a) remove air from feed water
- ☐ (b) heat feed water
- ☐ (c) store feed water
- ☒ (d) all of the above

*If choice d is selected set score to 1.*

**82.** (1.4.9.1-4) The DC heater automatic level dump valve is used to \_\_\_\_\_.

- ☒ (a) drain excess feed water to the distilled water tank
- ☐ (b) divert the flow of condensate from the first stage heater to the vent condenser
- ☐ (c) recirculate condensate to the atmospheric drain tank
- ☐ (d) maintain a proper condensate level in the condenser hot well

*If choice a is selected set score to 1.*

**83.** (1.4.9.1-6) Cooling water to the vent condenser in a DC heater is supplied by the \_\_\_\_\_.

- ☐ (a) salt water circulator
- ☒ (b) main and/or auxiliary condensate pump
- ☐ (c) main feed pump
- ☐ (d) feed booster pump

*If choice b is selected set score to 1.*

**84.** (1.4.9.2-4) When starting a turbine driven boiler feed pump, care should be taken to insure that the recirculating valve is open. Which of the following valves should be closed when starting?

- ☐ (a) Turbine exhaust valve
- ☐ (b) Pump suction valve
- ☐ (c) Turbine steam supply valve
- ☒ (d) Pump discharge valve

*If choice d is selected set score to 1.*

**85.** (1.4.9.2-3) To prevent pulsations from developing in the boiler feed water lines, the discharge side of a reciprocating feed pump is equipped with a/an \_\_\_\_\_.

- ☐ (a) feed water regulator
- ☒ (b) air chamber
- ☐ (c) reed valve
- ☐ (d) relief valve

*If choice b is selected set score to 1.*

**86.** (1.4.9.2-5) If a centrifugal main feed pump were operated at shutoff head with the recirculating line closed, which of the following conditions could occur?

- ☐ (a) A decreased water level in the DC heater.
- ☐ (b) An increased water level in the steam drum.
- ☒ (c) Flashing at the suction side of the pump.
- ☐ (d) Excessive diaphragm seal wear in the feed water regulator.

*If choice c is selected set score to 1.*

**87.** (1.4.9.2-1) The pressure in the feed water system must exceed boiler steam drum pressure in order to \_\_\_\_\_.

- ☐ (a) prevent air leakage into the feed water system
- ☐ (b) prevent water hammer in the lines
- ☐ (c) remove the steam from the steam drum
- ☒ (d) force the feed water into the boiler

*If choice d is selected set score to 1.*

**88.** (1.4.9.3-4) If manual control of the water level in a steaming boiler is required, the proper method of control is with the auxiliary feed \_\_\_\_\_.

- ☐ (a) pump pressure control
- ☒ (b) stop-check valve
- ☐ (c) stop valve
- ☐ (d) pump speed control

*If choice b is selected set score to 1.*

**89.** (1.4.9.3-2) Which system should be used when required to raise the water level in an idle boiler?

- ☐ (a) Main condensate system
- ☒ (b) Main feed system
- ☐ (c) Auxiliary condensate system
- ☐ (d) Chemical feed system

*If choice b is selected set score to 1.*

**90.** (1.4.9.3-3) Under EMERGENCY operating conditions, the proper valve positions for controlling feed water to the boiler should be the \_\_\_\_\_.

- (a) auxiliary stop-check valve fully open and the auxiliary stop valve regulated by the feed water regulator
- (b) auxiliary stop-check valve fully open and the auxiliary stop valve used to regulate the amount of flow
- (c) auxiliary stop and stop-check valves fully open and the feed pump speed used to regulate the amount of flow
- (d) auxiliary stop valve fully open and the auxiliary stop-check valve used to regulate the amount of flow

*If choice d is selected set score to 1.*

**91.** (1.4.9.3-7) In the system illustrated the valves at point "A" are \_\_\_\_\_. SG-0005

- (a) swing check/ stop valves
- (b) gauge valves/ drain valves
- (c) globe valves/ gate valves
- (d) stop-check/ stop valves

*If choice d is selected set score to 1.*

**92.** (1.4.9.3-6) Which of the listed order of valves represents the proper installation of the main feed water supply line to a marine propulsion boiler?

- (a) Stop, regulator, stop-check
- (b) Regulator, stop, stop-check
- (c) Stop-check, stop, regulator
- (d) Stop-check, regulator, stop

*If choice d is selected set score to 1.*

**93.** (1.4.9.3-1) When operating with the auxiliary feed line, feed water flow is controlled \_\_\_\_\_.

- (a) automatically by the economizer bypass
- (b) manually by adjustment of the auxiliary feed water regulator spring setting
- (c) manually by throttling the auxiliary feed stop-check valve
- (d) automatically by the main feed water regulator

*If choice c is selected set score to 1.*

**94.** (1.4.9.3-5) The main feed check valve functions to \_\_\_\_\_.

- ☐ (a) reduce feed pump discharge pressure loading
- ☒ (b) prevent backflow of water from the boiler in the event of a feed pump failure
- ☐ (c) check pressure pulsations in the feed line
- ☐ (d) provide feed pump positive discharge head

*If choice b is selected set score to 1.*

**95.** (1.4.9.4-1) In the event of a failure of the pneumatic control system, a multi-element feed water regulator is designed to operate as a \_\_\_\_\_.

- ☐ (a) constant-volume feed water regulator
- ☒ (b) manually controlled feed water regulator
- ☐ (c) constant-pressure regulator
- ☐ (d) thermo-hydraulic feed water regulator

*If choice b is selected set score to 1.*

**96.** (1.4.10.1-1) Why are two fuel oil heaters "E" provided in the fuel oil system shown in the illustration?  
SG-0009

- ☐ (a) To allow fuel of different temperatures to be provided to be provided to each boiler.
- ☐ (b) Two heaters are necessary when both boilers steam at full load.
- ☒ (c) To provide a backup in case one of the heaters becomes inoperable.
- ☐ (d) Each heater supplies fuel to a different boiler.

*If choice c is selected set score to 1.*

**97.** (1.4.10.2-2) Fuel oil settling tanks are used to \_\_\_\_\_.

- ☐ (a) store oil for immediate use
- ☐ (b) precipitate out water and solids
- ☐ (c) facilitate the stripping of sludge and water
- ☒ (d) all of the above

*If choice d is selected set score to 1.*

**98.** (1.4.10.2-3) The main reason for having a low suction line on the fuel oil service or settling tanks is to \_\_\_\_\_.

- ☐ (a) increase the amount of fuel available for use
- ☐ (b) decrease suction head on the pump
- ☐ (c) prevent loss of suction during rough weather
- ☒ (d) facilitate water removal

*If choice d is selected set score to 1.*

**99.** (1.4.10.2-1) When you are transferring fuel oil to the settling tanks, precautions to be observed should include \_\_\_\_\_.

- (a) maintaining a high transfer rate until a slight trickle of oil is observed flowing from the overflow line
- (b) maintaining a supply of chemical dispersant to cleanup minor oil spills adjacent to the ship
- (c) sounding the tanks frequently and reducing the transfer rate as the level approaches maximum fill
- (d) plugging gooseneck tank vents to prevent accidental overflow

*If choice c is selected set score to 1.*

**100.** (1.4.11.1-1) Which of the listed conditions aids in directing gland leakoff steam from the low pressure propulsion turbine to pass through the gland exhaust condenser?

- (a) The use of a gland exhauster fan.
- (b) Steam pressure from the low pressure turbine.
- (c) Steam pressure from the high pressure turbine.
- (d) Compressed air in the air pilot.

*If choice a is selected set score to 1.*

**101.** (1.4.11.1-2) Gland sealing steam is used during steam turbine operation to prevent the loss of \_\_\_\_\_.

- (a) air
- (b) vacuum
- (c) temperature
- (d) oil

*If choice b is selected set score to 1.*

**102.** (1.4.11.1-3) How is an excess of turbine gland seal steam remedied?

- (a) It exhausts to atmosphere.
- (b) It drains to the makeup feed tank.
- (c) It is recirculated via the loop seal.
- (d) It is directed to the gland exhaust condenser.

*If choice d is selected set score to 1.*

**103.** (1.4.11.1-4) The main turbine gland sealing system is designed to \_\_\_\_\_.

- (a) seal the turbine shaft against air leakage into the turbine casing
- (b) allow minimal steam leakage out of the gland
- (c) regulate steam pressure to the glands when the main turbine is operating at reduced speeds
- (d) all of the above

*If choice d is selected set score to 1.*

**104.** (1.4.11.1-5) According to illustration SE-0019, piston "F" in the gland seal regulator is moved upward by \_\_\_\_\_. SE-0019

- ☐ (a) control air
- ☐ (b) nitrogen
- ☐ (c) steam pressure
- ☒ (d) lube oil pressure

*If choice d is selected set score to 1.*

**105.** (1.4.11.1-6) According to the illustration (SE-0019), bellows "I" in the gland seal regulator is actuated by \_\_\_\_\_. SE-0019

- ☐ (a) lube oil pressure
- ☐ (b) control air pressure
- ☒ (c) gland seal steam pressure
- ☐ (d) steam throttle pressure

*If choice c is selected set score to 1.*

**106.** (1.4.11.1-7) As shown in the illustration, live steam is supplied to the gland seal regulator via \_\_\_\_\_. Illustration SE-0019

- ☐ (a) line "G"
- ☐ (b) line "A"
- ☒ (c) line "C"
- ☐ (d) line "D"

*If choice c is selected set score to 1.*

**107.** (1.4.11.1-8) For the gland seal regulator shown in the illustration, an increase in gland seal pressure will result in \_\_\_\_\_. Illustration SE-0019

- ☒ (a) piston "F" moving upward to shut the makeup steam valve "B" and open the exhaust valve "E"
- ☐ (b) piston "F" moving downward to shut the makeup steam valve "B" and open the exhaust valve "E"
- ☐ (c) piston "F" moving upward to open the makeup steam valve "B" and close the exhaust valve "E"
- ☐ (d) piston "F" moving downward to open the makeup steam valve "B" and close the exhaust valve "E"

*If choice a is selected set score to 1.*

**108.** (1.4.12.1-4) Which of the following conditions is indicated by oil flowing through a lube oil gravity tank overflow sight glass?

- ☐ (a) Excessive oil is stored in the gravity tank.
- ☐ (b) Insufficient oil is being pumped to the gravity tank.
- ☐ (c) Turbine bearing failure has occurred.
- ☒ (d) Sufficient oil flow is being supplied to the gravity tank.

*If choice d is selected set score to 1.*

**109.** (1.4.12.1-2) Which of the following statements about gravity type lube oil systems is correct?

- ☐ (a) The discharge from the gravity tanks flows to the lube oil pump suction.
- ☐ (b) Any lube oil pump failure causes immediate damage to turbine bearings.
- ☒ (c) Gravity tank overflow lines are lead directly to the lube oil sump.
- ☐ (d) Gravity tanks are fitted with an overflow alarm.

*If choice c is selected set score to 1.*

**110.** (1.4.12.1-1) In a gravity lube oil system, a sight glass is installed in a line near the operating platform. This line connects the \_\_\_\_\_.

- ☒ (a) gravity tank overflow and the sump
- ☐ (b) bottom of the gravity tank and the lube oil headers
- ☐ (c) bottom of the gravity tank and the sump
- ☐ (d) gravity tank overflow and the lube oil headers

*If choice a is selected set score to 1.*

**111.** (1.4.12.1-3) The gravity tank in a gravity lube oil system serves to \_\_\_\_\_.

- ☐ (a) supply the lube oil service pump with a positive suction head
- ☒ (b) maintain oil supply for several minutes to bearings should the lube oil service pump fail
- ☐ (c) store heated lube oil
- ☐ (d) settle lube oil prior to purifying

*If choice b is selected set score to 1.*

**112.** (1.4.12.2-2) The lube oil coolers installed in a gravity lubricating oil system are located between the \_\_\_\_\_.

- ☐ (a) gravity tanks and lube oil sump
- ☐ (b) lube oil sump and lube oil pumps
- ☒ (c) lube oil pumps and gravity tanks
- ☐ (d) gravity tanks and main units

*If choice c is selected set score to 1.*



**113.** (1.4.12.2-4) Which of the following statements is true concerning lube oil coolers?

- ☐ (a) Magnets are installed in the tube sheets to remove metal particles.
- ☐ (b) The temperature of the oil is less than that of the cooling water.
- ☒ (c) The pressure of the oil is greater than that of the cooling water.
- ☐ (d) The pressure of the oil is less than that of the cooling water.

*If choice c is selected set score to 1.*

**114.** (1.4.12.2-3) What type of lube oil cooler is shown in the illustration? GS-0122

- ☒ (a) Shell-and-tube
- ☐ (b) Self venting
- ☐ (c) Bundle and stack
- ☐ (d) Plate type

*If choice a is selected set score to 1.*

**115.** (1.4.12.2-1) During high speed operation of the main turbine propulsion unit, the heat absorbed by the lubricating oil is removed by the \_\_\_\_\_.

- ☐ (a) distillate cooler
- ☐ (b) lube oil purifier
- ☐ (c) sump vents
- ☒ (d) lube oil cooler

*If choice d is selected set score to 1.*

**116.** (1.4.12.3-2) If the main and standby lube oil service pumps of the main engine fail while underway at sea, \_\_\_\_\_.

- ☐ (a) the turbine bearings will immediately fail
- ☒ (b) an emergency supply of oil in the gravity tank will provide time to crash stop the turbine and gears
- ☐ (c) the reduction gear bearings will immediately fail
- ☐ (d) emergency lubrication can be supplied through the use of the hand pump

*If choice b is selected set score to 1.*

**117.** (1.4.12.3-1) In a pressure type main propulsion turbine lubrication system, the lube oil service pumps normally take suction from the main sump and discharge directly to the \_\_\_\_\_.

- ☐ (a) main thrust bearing
- ☒ (b) lube oil coolers
- ☐ (c) gravity feed tank
- ☐ (d) lube oil header

*If choice b is selected set score to 1.*

**118.** (1.4.12.4-2) Lube oil is preheated before centrifuging in order to \_\_\_\_\_.

- ☐ (a) boil off water
- ☒ (b) improve purification
- ☐ (c) reduce friction of the rotating components of the centrifuge
- ☐ (d) prevent corrosion

*If choice b is selected set score to 1.*

**119.** (1.4.12.4-6) Water is best removed from lubricating oil by \_\_\_\_\_.

- ☒ (a) centrifuging
- ☐ (b) pressure filters
- ☐ (c) silica gel cartridges
- ☐ (d) paper edge filters

*If choice a is selected set score to 1.*

**120.** (1.4.12.4-7) The item shown in the illustration is commonly identified as a \_\_\_\_\_. GS-0124

- ☒ (a) bowl type purifier
- ☐ (b) machine shop lathe attachment
- ☐ (c) machine shop milling machine attachment
- ☐ (d) disk type purifier

*If choice a is selected set score to 1.*

**121.** (1.4.12.4-1) Sludge tanks are used in an oil lubricating system to receive \_\_\_\_\_.

- ☒ (a) foreign liquid matter, discharged from the lube oil purifier or the stripping pump
- ☐ (b) all of the oil that passes through the lube oil coolers
- ☐ (c) makeup oil that is to be added to the system after settling
- ☐ (d) bilge slops that can be reclaimed after clarification

*If choice a is selected set score to 1.*

**122.** (1.4.12.4-4) The bulk of the solid material entering a centrifugal purifier with lube oil is \_\_\_\_\_.

- ☒ (a) trapped in the bowl
- ☐ (b) discharged with the water
- ☐ (c) trapped in the filter
- ☐ (d) forced out the overflow

*If choice a is selected set score to 1.*

**123.** (1.4.12.4-5) The dirty oil inlet on centrifugal lube oil purifiers is located at the \_\_\_\_\_.

- (a) bottom of the tubular bowl type
- (b) top or bottom of the disk type depending upon whether the unit is to be operated as a separator or clarifier
- (c) bottom only of the disk type
- (d) top of the tubular bowl type

*If choice a is selected set score to 1.*

**124.** (1.4.12.4-3) In a disk type centrifugal purifier, the bowl is mounted on the upper end of the \_\_\_\_\_.

- (a) radial thrust bearing
- (b) bowl spindle
- (c) worm wheel
- (d) friction clutch

*If choice b is selected set score to 1.*

**125.** (1.4.12.4-8) Of the many impurities commonly found in marine lubricating oil, which of the following CANNOT be removed by a centrifugal purifier at normal operating speeds and temperatures?

- (a) Carbon particles
- (b) Metal particles
- (c) Diesel fuel oil
- (d) Water

*If choice c is selected set score to 1.*

**126.** (1.4.12.5-4) What type of strainer is used in a turbine lube oil system to remove metallic particles?

- (a) Fuller's earth filter
- (b) Magnetic basket strainer
- (c) Simplex filter
- (d) Metal edge strainer

*If choice b is selected set score to 1.*

**127.** (1.4.12.5-5) Magnets are installed in the main propulsion turbine lube oil strainers to attract metal particles released through wearing of the \_\_\_\_\_.

- (a) turbine blades
- (b) Babbitt bearings
- (c) reduction gears
- (d) turbine labyrinth

*If choice c is selected set score to 1.*

**128.** (1.4.12.5-2) Which of the filter/strainer units listed permits you to clean the element while leaving the system on the line?

- ☐ (a) Simplex
- ☒ (b) Duplex
- ☐ (c) Canister
- ☐ (d) Bypass

*If choice b is selected set score to 1.*

**129.** (1.4.12.5-3) As the speed of an oil lubricated ball bearing increases, fluid friction, due to churning, generates heat. This condition may be avoided by \_\_\_\_\_.

- ☐ (a) adding more lubricant until the ball bearings are completely covered with a layer of oil
- ☒ (b) reducing the quantity of lubricant until only a mist of oil is present on the ball bearings
- ☐ (c) maintaining a continuous fluid level over half of the outer race
- ☐ (d) installing oil rings on the ball bearings

*If choice b is selected set score to 1.*

**130.** (1.4.12.5-1) Which of the filters listed will deplete the additives in lubricating oil?

- ☐ (a) Extended area membrane filter
- ☐ (b) Cloth bag extractor
- ☐ (c) Absorbent filter
- ☒ (d) Adsorbent filter

*If choice d is selected set score to 1.*

**131.** (1.4.13.1-1) After the steam leaves the low pressure turbine, it enters the \_\_\_\_\_.

- ☒ (a) main condenser
- ☐ (b) turbine extraction valve manifold
- ☐ (c) feed and filter tank
- ☐ (d) first-stage feed water heater

*If choice a is selected set score to 1.*

**132.** (1.4.14.1-2) In a cross-compounded turbine propulsion plant, steam enters the \_\_\_\_\_.

- ☐ (a) high pressure unit and then cross-flows to the condenser
- ☐ (b) high and low pressure units simultaneously
- ☒ (c) high pressure unit and then flows through a crossover to the low pressure unit
- ☐ (d) high pressure, intermediate and low pressure units simultaneously

*If choice c is selected set score to 1.*

**133.** (1.4.14.1-3) Steam supplied to the main propulsion turbines is \_\_\_\_\_.

- ☐ (a) desuperheated steam
- ☒ (b) superheated steam
- ☐ (c) saturated steam
- ☐ (d) wet steam

*If choice b is selected set score to 1.*

**134.** (1.4.14.1-1) Concerning the classification of steam turbines, a cross compound designed unit \_\_\_\_\_.

- ☐ (a) consists of reaction stages and a dummy piston
- ☒ (b) consists of a high pressure turbine, crossover pipe, and low pressure turbine
- ☐ (c) is made up of a varied assortment of impulse and reaction staging
- ☐ (d) consists of one Curtis stage and reaction blading

*If choice b is selected set score to 1.*

**135.** (1.4.14.2-1) An efficient seal is normally obtained between the upper and lower halves of a turbine casing by \_\_\_\_\_.

- ☐ (a) asbestos gaskets
- ☐ (b) flexible steel seal strips
- ☒ (c) precision metal-to-metal contact
- ☐ (d) copper gaskets

*If choice c is selected set score to 1.*

**136.** (1.4.14.2-3) Which of the devices listed is found on an LP main propulsion steam turbine casing?

- ☐ (a) Duplex set of relief valves
- ☐ (b) HP turbine bypass valve
- ☒ (c) Sentinel valve
- ☐ (d) Sliding beam

*If choice c is selected set score to 1.*

**137.** (1.4.14.2-7) The adjustable spherically seated self-aligning bearing housings used in main turbines are provided with oil deflector rings. The function of these rings is to \_\_\_\_\_.

- ☒ (a) prevent the external leakage of oil out of the bearing housing
- ☐ (b) ensure efficient lubrication of the bearing
- ☐ (c) direct the flow of oil through the bearing
- ☐ (d) prevent the leakage of main steam into the oil

*If choice a is selected set score to 1.*

**138.** (1.4.14.3-1) The jacking gear must be engaged as quickly as possible when securing the Main Turbines in order to \_\_\_\_\_.

- (a) prevent uneven cooling of the turbine rotors
- (b) maintain a constant supply of lube oil to the main unit
- (c) prevent the stern tube bearing from overheating
- (d) permit rapid cooling of the reduction gears

*If choice a is selected set score to 1.*

**139.** (1.4.14.3-2) The jacking gear on main propulsion turbines can be used to \_\_\_\_\_.

- (a) lift the reduction gear casing
- (b) provide propulsion in emergencies
- (c) provide reduction gear tooth inspection
- (d) reduce turbine speed during maneuvering

*If choice c is selected set score to 1.*

**140.** (1.4.14.4-2) A common method of preheating main turbine lube oil prior to rolling over the main unit would be to \_\_\_\_\_.

- (a) slightly increase gland sealing steam pressure
- (b) bypass the lube oil gravity tank
- (c) operate the lube oil purifier on the main lube oil sump
- (d) run both the lube oil pumps simultaneously

*If choice c is selected set score to 1.*

**141.** (1.4.14.4-3) To stop the rotor of a main turbine while underway at sea you should \_\_\_\_\_.

- (a) tighten the stern tube packing gland
- (b) secure all steam to the turbine
- (c) apply the prony brake
- (d) admit astern steam to the turbine after securing the ahead steam

*If choice d is selected set score to 1.*

**142.** (1.4.14.4-1) Which of the following operational practices is helpful in avoiding the accumulation of condensate in the main reduction gear casing?

- (a) The temperature of the lubricating oil should not exceed the gear manufacturer's recommendation when the unit is operating at full load.
- (b) Always ensure that the lubricating oil pressure is 1417 psi when operating in unusually cold waters.
- (c) Avoid applying gland sealing steam to the low pressure turbine until you are ready to start up the first-stage air ejector.
- (d) After the main unit is secured, lubricating oil should be circulated until the temperature of the oil and reduction gear casing approximates the engine room temperature.

*If choice d is selected set score to 1.*

**143.** (1.4.14.5-1) Guardian valves are installed on main propulsion turbines to \_\_\_\_\_.

- ☐ (a) provide an emergency means of quickly closing the throttle
- ☒ (b) prevent steam from leaking into the astern element while at full sea speed
- ☐ (c) prevent steam from leaking into the astern element while the vessel is maneuvering
- ☐ (d) provide a means to supply steam directly to the astern element of the turbine

*If choice b is selected set score to 1.*

**144.** (1.4.14.5-2) What will be the FIRST thing to occur if both the main and standby lube oil pumps failed to operate on a geared main propulsion steam turbine operating at full sea speed?

- ☒ (a) Ahead throttle will close.
- ☐ (b) Shaft brake will engage.
- ☐ (c) Vacuum will be lost.
- ☐ (d) Lube oil sump will overflow.

*If choice a is selected set score to 1.*

**145.** (1.4.16.1-5) While a vessel is underway, one of the FIRST indications of the failure of the gland leakoff exhaust fan motor is \_\_\_\_\_.

- ☒ (a) excessive steam leakage at the turbine glands
- ☐ (b) increased turbine exhaust temperature
- ☐ (c) water knock on the turbine gland steam header
- ☐ (d) loss of vacuum at the turbine

*If choice a is selected set score to 1.*

**146.** (1.4.16.1-2) Operating a steam turbine propulsion unit at reduced speed, in an area with extremely cold seawater, with the main circulating pump providing full cooling water flow to the condenser will result in \_\_\_\_\_.

- ☒ (a) decreased plant efficiency due to increased condensate depression
- ☐ (b) decreased plant efficiency due to higher attainable vacuum
- ☐ (c) a decreased requirement for gland sealing steam
- ☐ (d) increased plant efficiency due to increased condensate depression

*If choice a is selected set score to 1.*

**147.** (1.4.16.1-3) During normal operation of a main propulsion turbine, the lube oil supply temperature to the bearings should be maintained at approximately \_\_\_\_\_.

- ☐ (a) 72°F
- ☐ (b) 60°F
- ☒ (c) 120°F
- ☐ (d) 140°F

*If choice c is selected set score to 1.*

**148.** (1.4.16.1-4) Improper operation or faulty main steam turbine components may be indicated by an abnormal variation in \_\_\_\_\_.

- ☐ (a) speed
- ☐ (b) vibration
- ☐ (c) noise level
- ☒ (d) All of the above are individually correct

*If choice d is selected set score to 1.*

**149.** (1.4.16.1-1) The astern guarding valve on main propulsion steam turbine units must be open when a vessel is \_\_\_\_\_.

- ☒ (a) maneuvering into port
- ☐ (b) at full sea speed
- ☐ (c) running with a warm bearing
- ☐ (d) loading cargo

*If choice a is selected set score to 1.*

**150.** (1.4.16.1-6) Hot running bearings can be caused by \_\_\_\_\_.

- ☐ (a) inadequate lube oil supply
- ☐ (b) contaminated lube oil
- ☐ (c) excessive loading
- ☒ (d) all of the above

*If choice d is selected set score to 1.*

**151.** (1.4.16.1-7) An overheated bearing in the main propulsion unit is indicated by \_\_\_\_\_.

- ☐ (a) high level in the lube oil sump
- ☒ (b) high temperature of the lube oil leaving the bearing
- ☐ (c) bubbles in the sight flow glasses
- ☐ (d) sludge in the lube oil strainers

*If choice b is selected set score to 1.*

**152.** (1.4.16.1-8) While making your rounds, you notice the main lube oil temperature to be higher than normal. To remedy this situation, you should \_\_\_\_\_.

- ☐ (a) open the lube oil cooler seawater inlet valve wider
- ☐ (b) speed up the main lube oil pump
- ☒ (c) increase the opening of the lube oil cooler seawater discharge valve
- ☐ (d) throttle in on the lube oil cooler seawater discharge valve

*If choice c is selected set score to 1.*



**153.** (1.4.16.2-5) An excessive pressure differential across a lube oil strainer could indicate \_\_\_\_\_.

- (a) the strainer needs cleaning
- (b) the filter elements are installed upside down
- (c) the relief valve is stuck open
- (d) all of the above

*If choice a is selected set score to 1.*

**154.** (1.4.16.2-6) While a vessel is underway, which of the conditions listed would indicate a leak in the lube oil cooler?

- (a) Excessive lube oil consumption.
- (b) Contamination of the lube oil.
- (c) Excessive water discharge rate from the lube oil purifier.
- (d) Corrosion of the journals and bearings.

*If choice a is selected set score to 1.*

**155.** (1.4.16.2-7) When a sudden increase in pressure occurs in a forced lubrication system, you should check for a \_\_\_\_\_.

- (a) clogged lube oil pump suction
- (b) high lube oil sump level
- (c) loss of oil flow across one of the bearings
- (d) ruptured tube in the lube oil cooler

*If choice c is selected set score to 1.*

**156.** (1.4.16.2-11) A lube oil sample is taken from the main engine lube oil system and visually inspected. Which of the following would indicate water contamination?

- (a) A clear, amber color
- (b) A reddish-orange color
- (c) A black color
- (d) A milky-white color

*If choice d is selected set score to 1.*

**157.** (1.4.16.2-13) Excessive water in an operating lube oil system can be detected by \_\_\_\_\_.

- (a) sounding the lube oil settling tank
- (b) checking oil for unusually low temperature
- (c) the amount of water discharging from the lube oil purifier
- (d) examining the lube oil strainers

*If choice c is selected set score to 1.*

**158.** (1.4.16.2-12) In a gravity type lube oil service system, if no lube oil appears in the sight glass of the return drop line while underway, this is a positive indication that \_\_\_\_\_.

- ☐ (a) there is a failure of all lube oil pumps
- ☐ (b) no oil is flowing to the bearings
- ☒ (c) no oil is overflowing from the gravity tank
- ☐ (d) the gravity tanks are empty

*If choice c is selected set score to 1.*

**159.** (1.4.16.2-3) On a ship equipped with a gravity type lube oil system, which of the conditions listed will occur FIRST if the main lube oil pump discharge pressure is lost?

- ☐ (a) All bearing oil pressure will be lost.
- ☒ (b) An alarm will sound.
- ☐ (c) The astern throttle will immediately open.
- ☐ (d) Lube oil will be provided to the bearings and gears via the gravity tank overflow line.

*If choice b is selected set score to 1.*

**160.** (1.4.16.2-1) Lube oil temperature leaving the lube oil coolers is regulated by throttling the \_\_\_\_\_.

- ☒ (a) cooling water outlet valve
- ☐ (b) lube oil outlet valve
- ☐ (c) cooling water inlet valve
- ☐ (d) lube oil return flow valve

*If choice a is selected set score to 1.*

**161.** (1.4.16.2-2) The maximum temperature rise of oil passing through any reduction gear set, or bearing, should not exceed \_\_\_\_\_.

- ☒ (a) 50°F (27.8°C)
- ☐ (b) 90°F (44.5°C)
- ☐ (c) 70°F (38.9°C)
- ☐ (d) 30°F (16.7°C)

*If choice a is selected set score to 1.*

**162.** (1.4.16.2-10) The maximum lube oil temperature leaving the lube oil cooler of a main steam turbine propulsion system should \_\_\_\_\_.

- ☒ (a) never exceed 130°F
- ☐ (b) be about 180°F
- ☐ (c) never be more than 60°F below the lube oil inlet temperature
- ☐ (d) be dictated only by the existing sea water temperature

*If choice a is selected set score to 1.*

**163.** (1.4.16.3-2) A poorly cleaned lube oil purifier bowl may result in \_\_\_\_\_.

- ☐ (a) excessive lube oil consumption
- ☒ (b) improper separation
- ☐ (c) excessive water discharge rate
- ☐ (d) insufficient oil supply to the gravity tank

*If choice b is selected set score to 1.*

**164.** (1.4.16.3-3) During the routine inspection of an operating centrifugal lube oil purifier, you notice oil discharging through the water discharge port. Which of the following actions should be taken?

- ☒ (a) Add water to seal the bowl.
- ☐ (b) Decrease the temperature of the entering oil to lower the specific gravity.
- ☐ (c) Increase the bowl speed to balance the water and oil discharges.
- ☐ (d) Do nothing as this is normal.

*If choice a is selected set score to 1.*

**165.** (1.4.16.3-4) A centrifugal oil purifier should be shut down if the \_\_\_\_\_.

- ☐ (a) presence of oil is indicated in the gravity tank bull's-eye
- ☒ (b) purifier is vibrating badly
- ☐ (c) trapped water is discharged from the overflow line
- ☐ (d) observation cover clamp needs tightening

*If choice b is selected set score to 1.*

**166.** (1.4.16.3-1) In a disk type lubricating oil centrifuge \_\_\_\_\_.

- ☐ (a) all dirt and sludge are discharged with the cooling water
- ☒ (b) deterioration of the bowl ring gasket will cause the purifier to lose its water seal
- ☐ (c) sealing water must never be supplied until after oil is fed to the unit
- ☐ (d) the centrifuge driving gears are lubricated by the reclaimed oil as it leaves the bowl

*If choice b is selected set score to 1.*

**167.** (1.4.16.4-1) Which of the conditions listed should be immediately reported to the engineering officer on watch?

- ☒ (a) Oil in the drain inspection tank.
- ☐ (b) Water trickling in through the stern gland.
- ☐ (c) Steam leaving the vent of the gland exhaust condenser.
- ☐ (d) Lube oil passing through the bull's eye of the gravity tank overflow line.

*If choice a is selected set score to 1.*

**168.** (1.4.16.5-1) Air trapped within the main condenser shell is detrimental because it will \_\_\_\_\_.

- ☐ (a) cause heat to be transferred too rapidly
- ☐ (b) cause the turbine casing to warp and bow
- ☒ (c) decrease the vacuum in the main condenser
- ☐ (d) decrease the turbine exhaust steam temperature

*If choice c is selected set score to 1.*

**169.** (1.4.16.5-2) Serious tube leaks in the air ejector after condenser assembly may cause \_\_\_\_\_.

- ☐ (a) an overflow of the contaminated drain inspection tank
- ☒ (b) an overflow of the atmospheric drain tank
- ☐ (c) clogged steam strainers
- ☐ (d) fouled nozzles

*If choice b is selected set score to 1.*

**170.** (1.4.16.5-3) If the boiler water and condenser hot well levels are normal, but the DC heater level is only 30% of full, you should \_\_\_\_\_.

- ☐ (a) increase the speed of the condensate pump
- ☐ (b) bypass the vent condenser and third-stage feed heater
- ☒ (c) open the makeup feed
- ☐ (d) open the feed pump recirculating valve wide

*If choice c is selected set score to 1.*

**171.** (1.4.16.5-4) Vapor blowing from the air ejector condenser vent may be caused by \_\_\_\_\_.

- ☐ (a) excessive condensate pump speed
- ☐ (b) low condensate temperature
- ☐ (c) excess makeup feed being taken into the system
- ☒ (d) insufficient condensate flow

*If choice d is selected set score to 1.*

**172.** (1.4.16.5-5) Excessive water loss from the main feed system can be caused by \_\_\_\_\_.

- ☐ (a) excessive recirculation of condensate from the outlet of the air ejector condenser to the main condenser
- ☐ (b) a leak in the desuperheater internal gasket
- ☒ (c) an atmospheric drain tank trap frozen in the closed position
- ☐ (d) a vapor bound main condensate pump

*If choice c is selected set score to 1.*

**173.** (1.4.16.5-6) Saltwater contamination of condensate could occur at which component?

- ☐ (a) Inter condenser
- ☐ (b) DC heater
- ☐ (c) After condenser
- ☒ (d) Fresh water evaporator

*If choice d is selected set score to 1.*

**174.** (1.4.16.5-9) Excessive recirculation of condensate should be avoided, as it can cause \_\_\_\_\_.

- ☒ (a) excessive cooling of the condensate
- ☐ (b) overheating of the air ejectors
- ☐ (c) the condenser hot well to be completely drained at low speeds
- ☐ (d) overheating of the vent condenser

*If choice a is selected set score to 1.*

**175.** (1.4.16.5-10) The usual symptoms of cavitation in a main condensate pump would be \_\_\_\_\_.

- ☒ (a) noise and vibration
- ☐ (b) lifting of the relief valve
- ☐ (c) an increase in discharge pressure
- ☐ (d) an increase in suction pressure

*If choice a is selected set score to 1.*

**176.** (1.4.16.5-7) Which of the conditions listed could prevent a centrifugal condensate pump from developing its rated capacity?

- ☐ (a) Flooding of the main condenser hot well.
- ☒ (b) Closing the water seal line to the packing gland.
- ☐ (c) Operating the pump with a positive suction head.
- ☐ (d) Venting the pump to the vacuum side of the condenser.

*If choice b is selected set score to 1.*

**177.** (1.4.16.5-8) If the condensate level in the loop seal of the air ejector inter condenser is lost, \_\_\_\_\_.

- ☒ (a) air will be drawn back into the main condenser
- ☐ (b) no condensate will flow through the system
- ☐ (c) the air ejector will not transfer heat to the condensate
- ☐ (d) the air ejector will overheat

*If choice a is selected set score to 1.*

**178.** (1.4.16.6-1) Which of the following actions should be taken FIRST when the boiler fires begin to sputter due to water in the fuel oil?

- ☐ (a) Shift to the standby fuel oil heater.
- ☐ (b) Shift to the standby fuel oil pump.
- ☐ (c) Shift to the settler low suction valve.
- ☒ (d) Shift to the settler high suction valve.

*If choice d is selected set score to 1.*

**179.** (1.4.16.6-2) Which of the actions listed should be carried out immediately after securing the fires in one boiler of a two boiler ship?

- ☐ (a) Open the air registers wide to cool the furnace.
- ☐ (b) Secure the main feed pump.
- ☐ (c) Drain and refill the boiler with cold water.
- ☒ (d) Relieve all fuel oil service pressure to that boiler.

*If choice d is selected set score to 1.*

**180.** (1.4.16.6-3) Carbon deposits on the diffuser and register throat ring of a burner \_\_\_\_\_.

- ☐ (a) are of no consequence and may be left in place until a fireside inspection allows time for removal
- ☐ (b) allow heat loss to the boiler casing
- ☒ (c) interfere with air flow around the burner
- ☐ (d) cause pre-ignition of the atomized fuel

*If choice c is selected set score to 1.*

**181.** (1.4.16.6-4) If the water level in a steaming boiler is dropping rapidly and cannot be kept at the normal level by standard practices, you should \_\_\_\_\_.

- ☐ (a) speed up the feed pump to raise the water to normal
- ☒ (b) secure the fires and then secure the steam stop
- ☐ (c) secure the steam stop and then secure the fires
- ☐ (d) blow down the gauge glass to find the true water level

*If choice b is selected set score to 1.*

**182.** (1.4.16.6-8) Which steam plant watch operating condition will require priority attention over the other situations listed?

- ☒ (a) High water level in main propulsion boiler
- ☐ (b) Low level effluent in chlorination section of sewage tank
- ☐ (c) High level of lube oil in storage tank
- ☐ (d) Low level of lube oil in cleansing tank

*If choice a is selected set score to 1.*

**183.** (1.4.16.6-6) Prior to relieving the watch you should first check the fire room status by verifying the boiler steam drum level and \_\_\_\_\_.

- ☐ (a) port and starboard settling tank levels
- ☐ (b) preparing to blow tubes
- ☒ (c) inspecting the fires and burners
- ☐ (d) stack temperature

*If choice c is selected set score to 1.*

**184.** (1.4.16.6-5) If an oil fire occurs in the double casing of a steaming boiler, you should \_\_\_\_\_.

- ☐ (a) apply water with a smooth bore nozzle
- ☐ (b) increase the forced draft fan speed
- ☐ (c) secure the feed water supply to the boiler
- ☒ (d) secure the fuel oil supply to the burners

*If choice d is selected set score to 1.*

**185.** (1.4.16.6-7) Any abnormal condition or emergency occurring in the fire room must be immediately reported to the \_\_\_\_\_.

- ☒ (a) engineer on watch
- ☐ (b) U. S. Coast Guard
- ☐ (c) first assistant engineer
- ☐ (d) oiler on watch

*If choice a is selected set score to 1.*

**186.** (1.4.16.7-1) Which of the following procedures represents the proper care of unused burners during low load conditions?

- ☐ (a) They may be left in place, with fuel and steam secured as long as they are not fouled.
- ☒ (b) They should be removed, cleaned and stored in the rack on the burner bench.
- ☐ (c) They may be left in place, but only if they are clean and if fuel oil is recirculated to provide cooling.
- ☐ (d) They should be removed, cleaned, refitted with smaller tips and reinstalled to be ready for immediate use.

*If choice b is selected set score to 1.*

**187.** (1.4.16.7-2) To properly clean a burner tip, you should use \_\_\_\_\_.

- ☒ (a) a soft metal tool
- ☐ (b) light sand blast grit
- ☐ (c) a jack knife
- ☐ (d) a wire brush

*If choice a is selected set score to 1.*

**188.** (1.4.16.7-3) To properly remove the burner tip nut from the burner barrel, the barrel should be \_\_\_\_\_.

- ☐ (a) clamped in a machinist's vice on the work bench
- ☒ (b) held by the fixture on the burner cleaning bench
- ☐ (c) fixed in the burner stowage rack
- ☐ (d) removed from the gooseneck before removing the tip nut

*If choice b is selected set score to 1.*

**189.** (1.4.16.7-5) If you noted a large difference in the pressures indicated by a duplex pressure gage to the fuel oil system strainer, you should \_\_\_\_\_.

- ☒ (a) shift to a clean fuel oil strainer
- ☐ (b) secure the fuel oil service pump
- ☐ (c) increase the fuel pump discharge pressure
- ☐ (d) reduce the firing rate of the boilers

*If choice a is selected set score to 1.*

**190.** (1.4.16.7-4) Which of the conditions listed would indicate a dirty fuel oil strainer?

- ☐ (a) Decreasing pressure drop across the strainer
- ☐ (b) Decreasing fuel oil temperature
- ☐ (c) Dirt and sediment deposits in the atomizers
- ☒ (d) Decreasing fuel oil pressure at the burner manifold

*If choice d is selected set score to 1.*

**191.** (1.4.16.8-2) If water hammer develops while opening the valve in a steam line, which of the following actions should be taken?

- ☐ (a) Stop opening the steam valve, open the drain line valves, resume opening the steam valve slowly, and shut the drain line valves after the steam valve is open fully.
- ☐ (b) Increase the speed of opening the steam valve to rapidly heat the line to stop the water hammer.
- ☒ (c) Shut the steam valve at once, open the drain valves until all moisture is drained, shut the drain line valves, and slowly open the steam valve again.
- ☐ (d) Continue to fully open the steam valve as the drain line valves are opened until all moisture is drained, shut the drain line valves.

*If choice c is selected set score to 1.*



**192.** (1.4.16.8-3) Noise caused by condensate striking bends or fittings in a steam pipe line is called \_\_\_\_\_.

- ☐ (a) hydraulic lock
- ☒ (b) water hammer
- ☐ (c) piston slap
- ☐ (d) condensate depression

*If choice b is selected set score to 1.*

1. (2.7.0.1.1-1) Which of the following statements represents the function the nozzle assembly performs in an impulse turbine?
- ☐ (a) Provides an area where the steam is prevented from expanding prior to being directed against the rotor blades.
  - ☒ (b) Converts the steam's thermal energy into kinetic energy by increasing its velocity and directing it against the rotor blades.
  - ☐ (c) Converts the potential energy of steam into thermal energy by increasing its pressure and directing it against the turbine blades.
  - ☐ (d) Increases the velocity of the steam without a pressure drop across the diaphragm.

*If choice b is selected set score to 1.*

2. (2.7.0.1.1-2) The labyrinth packing ring in an interstage diaphragm of an impulse turbine is prevented from rotating by \_\_\_\_\_.
- ☐ (a) spring tension exerted on retaining rings
  - ☒ (b) a horizontal key joint extending into a slot
  - ☐ (c) steam pressure exerted on the packing segments
  - ☐ (d) the weight of the diaphragm acting on the packing ring

*If choice b is selected set score to 1.*

3. (2.7.0.1.1-3) Shrouding on impulse turbine blading is held in place by \_\_\_\_\_.
- ☒ (a) peening the tenons
  - ☐ (b) circumferential dovetails
  - ☐ (c) seal welding
  - ☐ (d) locking keys

*If choice a is selected set score to 1.*

4. (2.7.0.1.1-4) Tenon peening is a technique employed by turbine manufacturers to \_\_\_\_\_.
- ☐ (a) secure turbine blading to the rotor
  - ☐ (b) balance the turbine rotor assembly
  - ☒ (c) secure shroud bands to turbine blading.
  - ☐ (d) minimize turbine rotor axial thrust

*If choice c is selected set score to 1.*

5. (2.7.0.1.1-5) Which of the steam losses listed would be associated with a multistage impulse turbine rather than a multistage reaction turbine?
- ☒ (a) Diaphragm packing loss
  - ☐ (b) Blade and nozzle loss
  - ☐ (c) Radiation loss
  - ☐ (d) Leaving loss

*If choice a is selected set score to 1.*

6. (2.7.0.1.1-6) The purpose of shroud bands secured to the tips of the turbine blades is to \_\_\_\_\_.

- ☐ (a) increase blade resistance to moisture in steam
- ☐ (b) assist in maintaining radial clearances
- ☒ (c) stiffen the blades to reduce vibration
- ☐ (d) strengthen the blade root fastenings

*If choice c is selected set score to 1.*

7. (2.7.0.1.1-7) Steam passing through a multistage impulse turbine does not impart any appreciable axial thrust to the rotor. This is primarily due to the \_\_\_\_\_.

- ☐ (a) dummy piston and cylinder arrangement
- ☐ (b) steam velocity decreasing through the nozzle diaphragms
- ☒ (c) equalizing holes provided in the turbine wheel
- ☐ (d) pressure drop taking place through the moving blades

*If choice c is selected set score to 1.*

8. (2.7.0.1.1-8) In an impulse turbine, the fixed blades function to \_\_\_\_\_.

- ☐ (a) decrease steam velocity
- ☐ (b) equalize pressure differences
- ☒ (c) change the direction of steam flow
- ☐ (d) prevent steam turbulence

*If choice c is selected set score to 1.*

9. (2.7.0.1.2-1) The type of turbine shown in the illustration is classified as a \_\_\_\_\_.  
IllustrationSE-0003

- ☐ (a) pressure-compounded impulse
- ☒ (b) velocity-compounded impulse
- ☐ (c) pressure-compounded reaction
- ☐ (d) pressure-velocity compounded impulse

*If choice b is selected set score to 1.*

10. (2.7.0.1.2-2) A pressure-velocity compounded impulse turbine consists of \_\_\_\_\_.

- ☐ (a) several rows of moving blades attached to diaphragms
- ☐ (b) velocity compounding with reaction pressure compounding
- ☐ (c) two or more rows of nozzles in which no pressure drop exists
- ☒ (d) two or more stages of velocity compounding

*If choice d is selected set score to 1.*

**11.** (2.7.0.1.2-3) How many Curtis stages are contained in the turbine shown in the illustration?  
Illustration SE-0003

- (a) 1
- (b) 2
- (c) 3
- (d) only a reaction turbine stage is shown

*If choice a is selected set score to 1.*

**12.** (2.7.0.1.2-4) Design characteristics of a velocity-compounded impulse turbine include the utilization of \_\_\_\_\_.

- (a) one or more nozzles with one row of rotating blades
- (b) a low velocity steam jet from a nozzle
- (c) two or more simple impulse stages
- (d) a single pressure stage with two or more velocity stages

*If choice d is selected set score to 1.*

**13.** (2.7.0.1.3-1) Nozzle diaphragms are installed in pressure-compounded impulse turbines to \_\_\_\_\_.

- (a) eliminate blade and nozzle losses
- (b) support shrouding
- (c) support moving blades
- (d) hold the nozzles of the stage and admit steam to moving blades

*If choice d is selected set score to 1.*

**14.** (2.7.0.2.0-1) An impulse-reaction turbine is characterized by which of the following arrangements?

- (a) Velocity-compounded stages followed by reaction blading.
- (b) Stationary nozzles with impulse blading stages.
- (c) Reaction blading followed by impulse diaphragms.
- (d) Reaction stages followed by velocity-compounded blading.

*If choice a is selected set score to 1.*

**15.** (2.7.0.2.0-2) In what classification of steam turbines are the moving blades and the adjacent fixed rows of blades shaped to act as nozzles?

- (a) Impulse
- (b) Reaction
- (c) Helical flow
- (d) Radial flow

*If choice b is selected set score to 1.*

**16.** (2.7.0.2.0-3) In which type of turbine does a pressure drop exist through the fixed blades and the moving blades?

- ☐ (a) Curtis
- ☐ (b) Rateau
- ☒ (c) Reaction
- ☐ (d) Impulse

*If choice c is selected set score to 1.*

**17.** (2.7.0.2.0-4) An energy loss associated with a reaction turbine, but not an impulse turbine, is \_\_\_\_\_.

- ☐ (a) throttling loss
- ☐ (b) windage loss
- ☒ (c) tip leakage loss
- ☐ (d) leaving loss

*If choice c is selected set score to 1.*

**18.** (2.7.0.2.0-5) What is used to compensate for the increased possibility of blade vibration occurring with impulse turbine blading?

- ☒ (a) Securing the blade tips with shrouding.
- ☐ (b) The decreased pressure drop across the blade due to the thin tip design.
- ☐ (c) Seal stripping the groove within the turbine casing.
- ☐ (d) Tuned vibration dampers.

*If choice a is selected set score to 1.*

**19.** (2.7.0.2.0-6) A pressure drop occurs across both the moving and fixed blades of a reaction turbine as a result of the \_\_\_\_\_.

- ☒ (a) moving and fixed blades being shaped to act as nozzles
- ☐ (b) reversing blades causing a velocity drop with resultant pressure drop
- ☐ (c) interstage diaphragms creating a nozzle effect in the steam flow
- ☐ (d) conversion of the thermal energy to pressure energy always resulting in a pressure drop

*If choice a is selected set score to 1.*

**20.** (2.7.0.2.0-7) Which of the parts listed for a reaction turbine serve the same function as the nozzles of an impulse turbine?

- ☐ (a) Moving blades only
- ☐ (b) Moving nozzles
- ☐ (c) Fixed nozzles
- ☒ (d) Fixed blades and moving blades

*If choice d is selected set score to 1.*

**21.** (2.7.0.2.0-8) Why do double flow reaction turbines produce very little axial thrust?

- ☐ (a) Because there is no pressure drop across the blades.
- ☐ (b) Because equalizing holes are provided in the turbine wheels.
- ☐ (c) Because partially expanded steam is exhausted to the low pressure turbine where the expansion is completed.
- ☒ (d) Because the axial thrust is developed on the rotor in opposite directions providing counterbalance.

*If choice d is selected set score to 1.*

**22.** (2.7.0.2.0-9) What happens to the steam as it moves across the moving blades in a reaction turbine?

- ☒ (a) It creates an axial thrust in the direction of the steam flow.
- ☐ (b) It loses velocity at constant pressure.
- ☐ (c) It gains velocity at constant pressure.
- ☐ (d) It creates an axial thrust opposing the direction of steam flow.

*If choice a is selected set score to 1.*

**23.** (2.7.0.2.0-10) The general method of reducing turbine reaction blade vibration is by the use of \_\_\_\_\_.

- ☐ (a) casing diaphragms
- ☐ (b) dummy pistons
- ☒ (c) binding wire
- ☐ (d) casing seal strips

*If choice c is selected set score to 1.*

**24.** (2.7.0.3-1) Large temperature and pressure drops which occur in the first stage of a combination impulse and reaction turbine are caused by steam passing through \_\_\_\_\_.

- ☒ (a) one or more velocity-compounded impulse stages at the high pressure end of the turbine
- ☐ (b) a single row of blades more than once
- ☐ (c) a dummy piston and cylinder to offset axial thrust
- ☐ (d) a nozzle diaphragm in the low pressure end of the turbine

*If choice a is selected set score to 1.*

**25.** (2.7.1.0-1) Concerning the classification of steam turbines, a cross compound designed unit \_\_\_\_\_.

- ☐ (a) consists of one Curtis stage and reaction blading
- ☐ (b) is made up of a varied assortment of impulse and reaction staging
- ☒ (c) consists of a high pressure turbine, crossover pipe, and low pressure turbine
- ☐ (d) consists of reaction stages and a dummy piston

*If choice c is selected set score to 1.*

**26.** (2.7.1.0-2) In a cross-compounded turbine propulsion plant, steam enters the \_\_\_\_\_.

- (a) high pressure, intermediate and low pressure units simultaneously
- (b) high pressure unit and then cross-flows to the condenser
- (c) high and low pressure units simultaneously
- (d) high pressure unit and then flows through a crossover to the low pressure unit

*If choice d is selected set score to 1.*

**27.** (2.7.1.0-3) Why is superheated steam used in the main propulsion turbines instead of saturated steam?

- (a) Less specific energy available per pound of steam.
- (b) Greater heat energy available per pound of steam.
- (c) Higher pressure available than saturated steam.
- (d) Lower required specific volume than saturated steam.

*If choice b is selected set score to 1.*

**28.** (2.7.1.0-4) What is generally found at the end of the low pressure turbine rotor of a cross-compound turbine arrangement?

- (a) Cruising turbine
- (b) Back pressure turbine
- (c) High pressure turbine
- (d) Astern turbine

*If choice d is selected set score to 1.*

**29.** (2.7.1.0-5) As steam accomplishes work in an engine or turbine, the pressure of the steam is reduced because it \_\_\_\_\_.

- (a) becomes saturated again
- (b) diminishes in volume
- (c) expands in volume
- (d) becomes superheated again

*If choice c is selected set score to 1.*

**30.** (2.7.1.0-6) When a turbine is in operation, a rotor position micrometer is used to determine any change in rotor \_\_\_\_\_.

- (a) axial position relative to the micrometer
- (b) radial position relative to the casing
- (c) axial position relative to the casing
- (d) radial position relative to the micrometer

*If choice c is selected set score to 1.*

**31.** (2.7.1.0-7) A turbine assembly in which steam flows in series through a high pressure turbine and then on to a low pressure turbine, with both turbines driving a common reduction gear through separate shafts, is classified as \_\_\_\_\_.

- ☐ (a) tandem-compound
- ☐ (b) dual series
- ☐ (c) tandem, double flow
- ☒ (d) cross-compound

*If choice d is selected set score to 1.*

**32.** (2.7.1.0-8) As steam first enters the main propulsion turbine, which of the following energy conversions takes place?

- ☐ (a) mechanical to thermal
- ☒ (b) potential to kinetic
- ☐ (c) chemical to thermal
- ☐ (d) thermal to chemical

*If choice b is selected set score to 1.*

**33.** (2.7.1.0-9) For a large main propulsion turbine, the most commonly used turbine thrust bearing is the \_\_\_\_\_.

- ☒ (a) pivoted segmental shoe
- ☐ (b) overhung turbine wheel
- ☐ (c) self-oiling sleeve
- ☐ (d) self-aligning shell

*If choice a is selected set score to 1.*

**34.** (2.7.1.1.1-1) Journal bearings used with modern turbine rotors are manufactured in two halves in order to \_\_\_\_\_.

- ☐ (a) maintain axial alignment and reduce thrust
- ☐ (b) facilitate interchanging with other bearing halves
- ☐ (c) provide for positive oil flow at all loads
- ☒ (d) permit removal of the bearing without removing the rotor from the turbine

*If choice d is selected set score to 1.*

**35.** (2.7.1.1.1-2) Which of the journal bearings listed most easily accommodates the minor turbine shaft misalignment?

- ☐ (a) Spring bearings
- ☐ (b) Roller bearings
- ☒ (c) Spherically seated bearings
- ☐ (d) Ball bearings

*If choice c is selected set score to 1.*



**36.** (2.7.1.1.1-3) The adjustable spherically seated self-aligning bearing housings used in main turbines are provided with oil deflector rings. The function of these rings is to \_\_\_\_\_.

- ☐ (a) ensure efficient lubrication of the bearing
- ☐ (b) prevent the leakage of main steam into the oil
- ☐ (c) direct the flow of oil through the bearing
- ☒ (d) prevent the external leakage of oil out of the bearing housing

*If choice d is selected set score to 1.*

**37.** (2.7.1.1.1-4) The correct radial clearances between the rotor and the casing in a propulsion turbine are maintained by the turbine \_\_\_\_\_.

- ☐ (a) interstage packing
- ☐ (b) thrust bearing
- ☒ (c) journal bearings
- ☐ (d) diaphragms

*If choice c is selected set score to 1.*

**38.** (2.7.1.1.1-5) On a main propulsion turbine bearing, the readings obtained with a bridge gage represent the \_\_\_\_\_.

- ☐ (a) blade axial clearance
- ☐ (b) Babbitt thickness
- ☒ (c) oil clearance and bearing wear
- ☐ (d) diaphragm tip clearance

*If choice c is selected set score to 1.*

**39.** (2.7.1.1.1-6) Main steam turbine bearings are lined with \_\_\_\_\_.

- ☐ (a) ferrous oxide
- ☐ (b) cast-iron
- ☒ (c) Babbitt
- ☐ (d) steel

*If choice c is selected set score to 1.*

**40.** (2.7.1.1.1-7) For a large main propulsion turbine, the most commonly used turbine thrust bearing is the \_\_\_\_\_.

- ☐ (a) self-aligning shell
- ☐ (b) self-oiling sleeve
- ☒ (c) pivoted segmental shoe
- ☐ (d) overhung turbine wheel

*If choice c is selected set score to 1.*

**41.** (2.7.1.1.2-1) An efficient seal is normally obtained between the upper and lower halves of a turbine casing by \_\_\_\_\_.

- ☐ (a) asbestos gaskets
- ☒ (b) precision metal-to-metal contact
- ☐ (c) copper gaskets
- ☐ (d) flexible steel seal strips

*If choice b is selected set score to 1.*

**42.** (2.7.1.1.2-2) Turbine casing flanges are sometimes provided with a system of joint grooving to \_\_\_\_\_.

- ☐ (a) form a labyrinth seal between the casing halves
- ☐ (b) increase contact pressure between the casing halves' flanges
- ☒ (c) inject sealing compound between the casing halves
- ☐ (d) ensure perfect alignment of casing halves

*If choice c is selected set score to 1.*

**43.** (2.7.1.1.2-3) Allowance for axial expansion of the steam turbine due to temperature changes is provided for by the use of \_\_\_\_\_.

- ☐ (a) casing flexible joints
- ☒ (b) a deep flexible I beam support
- ☐ (c) pivoted-shoe type thrust bearings
- ☐ (d) rotor position indicators

*If choice b is selected set score to 1.*

**44.** (2.7.1.1.3-1) Which of the devices listed is found on an LP main propulsion steam turbine casing?

- ☐ (a) HP turbine bypass valve
- ☐ (b) Sliding beam
- ☒ (c) Sentinel valve
- ☐ (d) Duplex set of relief valves

*If choice c is selected set score to 1.*

**45.** (2.7.1.1.3-2) The purpose of the sentinel valve installed on a turbine casing is to \_\_\_\_\_.

- ☐ (a) vent excess steam to the main condenser
- ☒ (b) warn the engineer of excessive pressure in the low pressure turbine casing
- ☐ (c) warn the engineer of back flow of steam from the exhaust trunk
- ☐ (d) relieve excess pressure to the turbine extraction points

*If choice b is selected set score to 1.*

**46.** (2.7.1.1.4-1) The astern element of a main propulsion turbine is usually designed as a/an \_\_\_\_\_.

- ☐ (a) Parsons stage, reaction turbine
- ☒ (b) Curtiss stage, impulse turbine
- ☐ (c) multiple entry, helical flow turbine
- ☐ (d) single entry, double flow turbine

*If choice b is selected set score to 1.*

**47.** (2.7.1.1.4-2) Which of the following statements is true concerning the turbine shown in the illustration? Illustration SE-0016

- ☐ (a) The low pressure turbine is designed with reaction type stages
- ☐ (b) The astern element is of the Curtis type consisting of two three-row stages
- ☐ (c) The ahead rotor can be classified as a helical flow, Parsons type turbine
- ☒ (d) A steam deflector is provided between the astern element and the ahead stages of the LP turbine.

*If choice d is selected set score to 1.*

**48.** (2.7.1.1.5-1) Labyrinth seals used to reduce leakage around a turbine shaft are constructed of \_\_\_\_\_.

- ☐ (a) staged rubber composition seal stripping
- ☐ (b) spring bound carbon segments
- ☒ (c) machined metallic packing strips or fins
- ☐ (d) braided asbestos covered core segments

*If choice c is selected set score to 1.*

**49.** (2.7.1.1.5-2) When turbine rotor shafts extend through the casing, an external source of sealing steam is used in conjunction with labyrinth packing to \_\_\_\_\_.

- ☒ (a) seal the casing during periods of low casing pressure
- ☐ (b) maintain the rotor journal temperature
- ☐ (c) seal the casing during periods of high casing pressure
- ☐ (d) provide a constant flow to the gland leak off condenser

*If choice a is selected set score to 1.*

**50.** (2.7.1.1.5-3) The labyrinth seals used on rotating steam turbine shafts reduces external leakage by causing \_\_\_\_\_.

- ☐ (a) pressure increases through successive seal stages
- ☒ (b) successive pressure drops through the seal stages
- ☐ (c) increased turbulence through successively larger labyrinth clearances
- ☐ (d) successive temperature drops through the seal stages

*If choice b is selected set score to 1.*

**51.** (2.7.1.1.5-4) Labyrinth packing rings are installed on turbine diaphragms to minimize \_\_\_\_\_.

- (a) interstage steam leakage along the turbine rotor
- (b) steam from escaping to the atmosphere
- (c) pressure buildup on both sides of the diaphragm
- (d) air leakage from entering the turbine casing

*If choice a is selected set score to 1.*

**52.** (2.7.1.1.5-5) Where are moisture shields located in a main propulsion steam turbine?

- (a) At the steam strainer inlet
- (b) Around throttle valve stems
- (c) At the inner stage diaphragms
- (d) After the last stage of the ahead rotor blading

*If choice d is selected set score to 1.*

**53.** (2.7.1.2-1) The jacking/turning gear mechanism of a main propulsion geared turbine installation is normally connected through mechanical linkage to the \_\_\_\_\_.

- (a) high speed pinion rotor
- (b) low speed pinion rotor
- (c) low speed gear rotor
- (d) bull gear

*If choice a is selected set score to 1.*

**54.** (2.7.1.2-2) The jacking gear on main propulsion turbines can be used to \_\_\_\_\_.

- (a) provide reduction gear tooth inspection
- (b) provide propulsion in emergencies
- (c) reduce turbine speed during maneuvering
- (d) lift the reduction gear casing

*If choice a is selected set score to 1.*

**55.** (2.7.1.2-3) The main propulsion shaft turning gear usually connects to the free end of the high-speed high pressure pinion because the \_\_\_\_\_.

- (a) lubricating oil from the high-speed pinion can easily supply the turning gears
- (b) arrangement allows for the use of a muff type coupling for flexibility and smooth engagement
- (c) turning gears are double reduction worm type and cannot mate with the low pressure high-speed pinion
- (d) greatest gear ratio between the turning gear motor output and bull gear can be obtained

*If choice d is selected set score to 1.*

**56.** (2.7.1.2-4) Which of the devices listed is generally used to engage the main engine turning gear to the high pressure turbine high-speed pinion?

- ☐ (a) Manually operated band brake
- ☐ (b) Quill shaft
- ☐ (c) Sleeve coupling
- ☒ (d) Manually operated sliding jaw clutch

*If choice d is selected set score to 1.*

**57.** (2.7.1.3.0-1) The main propulsion turbine should be operated with the \_\_\_\_\_.

- ☐ (a) lowest practical chest pressure and the maximum number of nozzles possible to maintain the desired speed
- ☒ (b) highest practical chest pressure and the minimum number of nozzles required to maintain the desired speed
- ☐ (c) lowest practical chest pressure and the minimum number of nozzles required to maintain the desired speed
- ☐ (d) highest practical chest pressure and the maximum number of nozzles possible to maintain the desired speed

*If choice b is selected set score to 1.*

**58.** (2.7.1.3.0-2) Operating a steam turbine propulsion unit at medium speed, in an area with extremely cold seawater and the main circulating pump providing full cooling water flow to the condenser will result in \_\_\_\_\_.

- ☒ (a) increased condensate aeration due to the inability of the air ejectors to remove excessive air accumulation from the condenser
- ☐ (b) increased effectiveness of the air ejectors due to the increased main condenser vacuum
- ☐ (c) increased plant efficiency due to increased condensate depression
- ☐ (d) excellent plant efficiency due to higher attainable vacuum

*If choice a is selected set score to 1.*

**59.** (2.7.1.3.0-3) During normal operation of a main propulsion turbine, the lube oil supply temperature to the bearings should be maintained at approximately \_\_\_\_\_.

- ☐ (a) 135°F
- ☒ (b) 110°F
- ☐ (c) 72°F
- ☐ (d) 60°F

*If choice b is selected set score to 1.*

**60.** (2.7.1.3.1-1) Before placing the jacking gear in operation on a main turbine unit, you must always insure that \_\_\_\_\_.

- (a) the gland seal steam system is operating
- (b) the main lube oil system is operating
- (c) the condensate system is operating
- (d) the main salt water circulating pump is operating

*If choice b is selected set score to 1.*

**61.** (2.7.1.3.1-2) The most critical period of main turbine operation is during cold start-up, rather than hot shutdown because \_\_\_\_\_.

- (a) harmonic vibrations associated with critical speed can easily be reached during start-up
- (b) the danger of blade erosion damage from dry steam impingement is greater during start-up
- (c) lubricant film thickness during start-up is considerably less than the dimensions of gear surface irregularities
- (d) differential expansion can result from the temperature difference between the rotor and rotor casing

*If choice d is selected set score to 1.*

**62.** (2.7.1.3.1-3) Prior to rolling the main turbines in preparation for getting underway, you should \_\_\_\_\_.

- (a) disengage the turning gear
- (b) circulate the lube oil through the emergency lube oil cooler
- (c) secure the gland sealing steam regulator
- (d) open the reduction gear casing access plates and inspect the lube oil spray pattern

*If choice a is selected set score to 1.*

**63.** (2.7.1.3.1-4) Which of the listed procedures should be followed when raising vacuum on the main propulsion plant prior to getting underway?

- (a) Start the lube oil system, start the second-stage air ejector and the gland sealing system, start the condensate and circulating pumps, and start the turning gear.
- (b) Start the lube oil system, engage the turning gear, start the condensate and circulating pumps, start the gland sealing system and second-stage air ejector.
- (c) Start the condensate and circulating pumps, start the lube oil system, start the air ejectors and the gland sealing system, and engage the turning gear.
- (d) Start the condensate and circulating pumps, engage the turning gear, start the lube oil system, then start the first-and second-stage air ejectors and the gland sealing.

*If choice b is selected set score to 1.*

**64.** (2.7.1.3.1-5) After properly lining up the main propulsion turbine for warm up, steam should first be admitted to the rotor through the \_\_\_\_\_.

- ☐ (a) ahead throttle valve
- ☒ (b) astern throttle valve
- ☐ (c) LP turbine bleed valve
- ☐ (d) HP turbine bleed valve

*If choice b is selected set score to 1.*

**65.** (2.7.1.3.2-1) When a turbine rotor is not rotating during maneuvering, the heat tends to be concentrated at the \_\_\_\_\_.

- ☒ (a) top of the turbine
- ☐ (b) exhaust trunk
- ☐ (c) turbine bleed lines
- ☐ (d) casing joints

*If choice a is selected set score to 1.*

**66.** (2.7.1.3.2-2) With vacuum up and the main propulsion turbine standing by while awaiting engine orders, it is necessary to roll the unit alternately ahead and astern every five minutes to \_\_\_\_\_.

- ☐ (a) warm the astern guarding valve and the low lube oil pressure throttle trip
- ☒ (b) reduce the possibility of warping the turbine rotors
- ☐ (c) distribute the gland sealing steam evenly throughout the glands
- ☐ (d) slowly bring the lube oil and bearings to operating temperature

*If choice b is selected set score to 1.*

**67.** (2.7.1.3.3-1) To stop the rotor of a main turbine while underway at sea you should \_\_\_\_\_.

- ☐ (a) secure all steam to the turbine
- ☐ (b) tighten the stern tube packing gland
- ☐ (c) apply the prony brake
- ☒ (d) admit astern steam to the turbine after securing the ahead steam

*If choice d is selected set score to 1.*

**68.** (2.7.1.3.3-2) The jacking gear must be engaged as quickly as possible when securing the Main Turbines in order to \_\_\_\_\_.

- ☐ (a) permit rapid cooling of the reduction gears
- ☐ (b) maintain a constant supply of lube oil to the main unit
- ☐ (c) prevent the stern tube bearing from overheating
- ☒ (d) prevent uneven cooling of the turbine rotors

*If choice d is selected set score to 1.*

**69.** (2.7.1.3.3-3) To prevent damage to the turning gear mechanism, which of the following procedures must be carried out before the turning gear is engaged?

- ☐ (a) The brake on the first reduction worm shaft must be set.
- ☒ (b) The propeller shaft must be stopped and held stationary until the clutch is engaged.
- ☐ (c) The engine order telegraph must be on 'stop'.
- ☐ (d) The speed of the astern turbine must be reduced.

*If choice b is selected set score to 1.*

**70.** (2.7.1.3.3-4) When securing a main propulsion turbine equipped with carbon packing glands, the vacuum should always be broken before securing the gland seal steam because \_\_\_\_\_.

- ☐ (a) gland seal leak off lines will flood with water
- ☐ (b) the turbine rotor expands faster than the gland casing
- ☒ (c) cold air rapidly entering the gland may result in damage to the carbon segments and sealing surfaces
- ☐ (d) loop seal will flood the after condenser

*If choice c is selected set score to 1.*

**71.** (2.7.1.3.3-5) In securing the main turbines, steam to the second stage air ejectors should be left on for a short period of time in order to \_\_\_\_\_.

- ☐ (a) insure equal cooling of the main turbine bearings
- ☐ (b) prevent excessive condensate depression
- ☐ (c) remove the excessive amount of non-condensable vapors which accumulated during maneuvering operations
- ☒ (d) dry out the main turbines

*If choice d is selected set score to 1.*

**72.** (2.7.1.3.3-6) The FIRST step in breaking vacuum on a main turbine unit should be to \_\_\_\_\_.

- ☐ (a) secure the steam to the gland seal system
- ☐ (b) stop the main circulating pump
- ☐ (c) stop the main condensate pump
- ☒ (d) secure the steam to the main air ejector

*If choice d is selected set score to 1.*

**73.** (2.7.1.4-1) A common cause of the Babbitt linings cracking in a turbine journal bearing is from \_\_\_\_\_.

- ☐ (a) excessive thrust bearing wear
- ☐ (b) prolonged operation at low speed
- ☐ (c) prolonged operation at full speed
- ☒ (d) vibration generated by the rotor

*If choice d is selected set score to 1.*



**74.** (2.7.1.4-2) Excessive thrust bearing wear in a main propulsion turbine rotor should FIRST become apparent by \_\_\_\_\_.

- ☐ (a) an intermittent vibration when changing speed
- ☐ (b) metal particles in the lube oil purifier
- ☐ (c) rubbing noises when jacking over the main unit
- ☒ (d) taking rotor position indicator readings

*If choice d is selected set score to 1.*

**75.** (2.7.1.4-3) The original bridge gage reading for a reduction gear bearing was measured as .008 inches. A year later, the bridge gage reading for the same bearing is .010 inches. This indicates \_\_\_\_\_.

- ☐ (a) oil clearance is .002 inch
- ☐ (b) bearing wear is .010 inch
- ☒ (c) bearing wear is .002 inch
- ☐ (d) oil clearance has increased .010 inch

*If choice c is selected set score to 1.*

**76.** (2.7.1.4-4) The main propulsion turbine can be damaged by \_\_\_\_\_.

- ☐ (a) maintaining vacuum too high
- ☐ (b) using the jacking gear when there is no vacuum
- ☒ (c) water carryover from the boilers
- ☐ (d) operating at slow speeds

*If choice c is selected set score to 1.*

**77.** (2.7.1.4-5) An overheated bearing in the main propulsion unit is indicated by \_\_\_\_\_.

- ☐ (a) bubbles in the sight flow glasses
- ☐ (b) sludge in the lube oil strainers
- ☐ (c) high level in the lube oil sump
- ☒ (d) high temperature of the lube oil leaving the bearing

*If choice d is selected set score to 1.*

**78.** (2.7.2.0-1) Most auxiliary turbines do not require an external source of gland sealing steam because they \_\_\_\_\_.

- ☒ (a) exhaust to pressures above atmospheric pressure
- ☐ (b) operate at relatively low pressures
- ☐ (c) operate with only a small amount of axial thrust
- ☐ (d) utilize carbon packing rings at the low pressure end

*If choice a is selected set score to 1.*

**79.** (2.7.2.0-2) Turbine throttling losses can best be described as a loss of energy occurring \_\_\_\_\_.

- (a) as steam passes through the steam admission valve and there is a drop in pressure without the performance of work
- (b) whenever there is leakage of steam from one stage to another through the throttle valve packing gland
- (c) as a result of friction created when steam passes through the nozzle block
- (d) as a result of fluid friction caused by frequently throttling the turbine wheel and blade speed

*If choice a is selected set score to 1.*

**80.** (2.7.2.1-3) The over speed tripping device installed on an auxiliary turbine is automatically actuated by \_\_\_\_\_.

- (a) hydraulic pressure
- (b) centrifugal force
- (c) pneumatic force
- (d) high back pressure

*If choice b is selected set score to 1.*

**81.** (2.7.2.1-2) An excess pressure governor is a special type of control device which would normally be found on a \_\_\_\_\_.

- (a) forced draft fan
- (b) main circulator pump
- (c) turbine-driven feed pump
- (d) low pressure propulsion turbine

*If choice c is selected set score to 1.*

**82.** (2.7.2.1-4) Carbon ring packing segments are secured in a shaft gland assembly of a steam turbine by means of \_\_\_\_\_.

- (a) centering rings
- (b) labyrinth rings
- (c) steam pressure
- (d) garter springs

*If choice d is selected set score to 1.*

**83.** (2.7.2.1-5) Packing rings installed on auxiliary turbines are generally lubricated by \_\_\_\_\_.

- (a) separate lube oil lines
- (b) a water leak off line
- (c) moisture in the turbine steam
- (d) a salt water service line

*If choice c is selected set score to 1.*

**84.** (2.7.2.1-6) Which type of packing is primarily utilized to control steam leakage from the casing of a modern auxiliary turbine?

- (a) labyrinth
- (b) Teflon
- (c) dovetail
- (d) carbon

*If choice a is selected set score to 1.*

**85.** (2.7.2.1-7) When fitting new carbon ring packing on a turbine rotor shaft, carefully filing the ends of the segments will \_\_\_\_\_.

- (a) provide for a greater oil wedge pressure
- (b) reduce the ring segment end clearance
- (c) reduce the clearance between the assembled ring segments and shaft
- (d) reduce the possibility of scoring the shaft

*If choice c is selected set score to 1.*

**86.** (2.7.2.2-1) To test an automatic low lube oil pressure trip on an idling turbo generator and at the same time prevent the chance of bearing damage, you should \_\_\_\_\_.

- (a) actuate the over speed trip, making a note at what pressure the oil is dumped from under the operating piston
- (b) secure the steam supply valve to the throttle valve and observe the oil pressure as the throttle trips during the slowdown and ensure a supply of oil with the hand or standby pump when the pressure drops to 2-3 psi
- (c) ensure the standby lube oil pump, if so equipped, is properly lined up and set in the 'auto' mode, or the hand pump is being operated and then actuate the emergency trip
- (d) close the generator steam throttle valve and then ensure a supply of oil through the hand or standby pump when the pressure drops to 5-6 psi

*If choice b is selected set score to 1.*

**87.** (2.7.2.2-2) The turbine of a turbo-electric drive should be secured by \_\_\_\_\_.

- (a) tripping the throttle trip by hand
- (b) dynamic braking of the generator
- (c) closing the main steam stops
- (d) closing the throttle by hand

*If choice a is selected set score to 1.*

**88.** (2.7.2.2-3) An auxiliary turbine boiler feed pump should normally be stopped by \_\_\_\_\_.

- (a) increasing the load on the driven unit
- (b) closing the exhaust valve slightly
- (c) actuating the throttle hand tripping device
- (d) rotating the hand lube oil pump backwards

*If choice c is selected set score to 1.*

**89.** (2.7.3.0-1) A steam driven 750 KW turbo generator has a rated speed of 1200 RPM. The over speed setting for this unit must not exceed \_\_\_\_\_.

- (a) 1380 RPM
- (b) 1440 RPM
- (c) 1320 RPM
- (d) 1500 RPM

*If choice a is selected set score to 1.*

**90.** (2.7.3.0-2) In any governor there is a small range of speed in which no corrective action occurs. This speed range is called the governor dead band and is caused by \_\_\_\_\_.

- (a) excessive sensitivity in the governor control valve
- (b) speed droop designed into the governor system
- (c) friction in the governor linkage and control valve
- (d) speeder spring surge in the governor servomotor system

*If choice c is selected set score to 1.*

**91.** (2.7.3.0-3) Rotating flyweights, acting against a spring force, will provide a simple type of \_\_\_\_\_.

- (a) reducing valve
- (b) safety valve
- (c) feed water regulator
- (d) governor

*If choice d is selected set score to 1.*

**92.** (2.7.3.0-4) A constant speed hydraulic governor would more than likely be installed on a \_\_\_\_\_.

- (a) turbo generator
- (b) main condensate pump
- (c) main propulsion turbine
- (d) main feed pump

*If choice a is selected set score to 1.*

**93.** (2.7.3.1-1) Which of the following statements describes how the main propulsion turbine over speed relay initiates closing of the throttle valve?

- (a) Excessive centrifugal force causes spring loaded fly balls to actuate a control lever.
- (b) Excessive speed causes an oil pump to develop sufficient pressure to open a spring loaded relay valve which tends to close the steam control valve.
- (c) Excessive speed causes an increase in lube oil control temperature which actuates a solenoid oil dump valve.
- (d) Excessive centrifugal force causes a spring loaded weight to trip a valve latch.

*If choice b is selected set score to 1.*

**94.** (2.7.3.2.1-1) When starting a turbo generator, you must provide lube oil pressure to the governor power piston by means of \_\_\_\_\_.

- (a) the hand operated or auxiliary lube oil pump
- (b) a line from the gravity tank
- (c) the main lube oil pump
- (d) a line from the other generator

*If choice a is selected set score to 1.*

**95.** (2.7.3.2.1-2) Which of the listed parts illustrated in the turbo generator governing system, provides the follow-up to prevent the nozzle valves from cycling between the fully open and fully closed positions, with each variation in turbine speed? Illustration SE-0009

- (a) O
- (b) D
- (c) H
- (d) E

*If choice d is selected set score to 1.*

**96.** (2.7.3.2.1-3) If two turbo-generators with the same no-load speed settings are operating in parallel, the unit whose governor has the lesser speed droop will \_\_\_\_\_.

- (a) have poor power response
- (b) have poor sensitivity characteristics
- (c) assume the smaller share of the load
- (d) assume the larger share of the load

*If choice d is selected set score to 1.*

**97.** (2.7.3.2.1-4) Which of the listed actions will occur when there is an increase in load on a ship service generator equipped with a centrifugal type hydraulic governor? Illustration SE-0009

- (a) Steam flow to the turbine decreases.
- (b) More oil will enter the operating cylinder (O).
- (c) The governor weights move outward.
- (d) The operating piston is forced to move lower.

*If choice b is selected set score to 1.*

**98.** (2.7.3.2.1-5) A pilot valve and servomotor are utilized in mechanical-hydraulic governing systems on a turbo generator unit in order to \_\_\_\_\_.

- (a) constant load on the turbine unit
- (b) provide sufficient force to operate large steam lifting beam control valves
- (c) allow parallel operation with zero speed droop
- (d) provide a means of maintaining constant output voltage

*If choice b is selected set score to 1.*

**99.** (2.7.3.2.1-6) A back pressure trip on a ship's service turbo-generator functions to trip the turbine under what circumstance?

- ☐ (a) lubricating oil pressure is too low
- ☐ (b) gland seal leak off pressure is too high
- ☐ (c) amount of cooling water to the condenser is excessive
- ☒ (d) amount of cooling water to the condenser is insufficient

*If choice d is selected set score to 1.*

**100.** (2.7.3.2.2-1) The over speed tripping device installed on an auxiliary turbine is automatically actuated by \_\_\_\_\_.

- ☐ (a) hydraulic pressure
- ☒ (b) centrifugal force
- ☐ (c) high back pressure
- ☐ (d) pneumatic force

*If choice b is selected set score to 1.*

**101.** (2.7.3.2.2-2) An excess pressure governor would normally be used on a \_\_\_\_\_.

- ☒ (a) turbine-driven feed pump
- ☐ (b) low pressure propulsion turbine
- ☐ (c) forced draft fan
- ☐ (d) main circulator pump

*If choice a is selected set score to 1.*

**102.** (2.7.3.2.2-3) The constant pressure governor of a turbine-driven feed pump maintains which of the following pressures at a constant value for all capacities?

- ☒ (a) Pump discharge
- ☐ (b) Pump suction
- ☐ (c) Turbine inlet
- ☐ (d) Turbine exhaust

*If choice a is selected set score to 1.*

**103.** (2.7.3.3-1) In addition to causing erosion of turbine blades, slugs of water in the steam supply to a turbine driven pump can result in \_\_\_\_\_.

- ☐ (a) loss of load with resultant turbine over speed
- ☒ (b) erratic governor operation
- ☐ (c) thermal shock to the bearings
- ☐ (d) overheating of the wearing rings

*If choice b is selected set score to 1.*

**104.** (2.7.3.3-2) A turbo generator back pressure trip can be actuated as a result of \_\_\_\_\_.

- ☐ (a) an excessive pressure drop through the turbine
- ☐ (b) a steam inlet valve being partially open
- ☒ (c) insufficient circulating water flow through the condenser
- ☐ (d) excessively low exhaust pressure

*If choice c is selected set score to 1.*

**105.** (2.7.4.0-1) The main throttle valve on a main propulsion turbine admits steam directly into the \_\_\_\_\_.

- ☒ (a) turbine steam chest
- ☐ (b) nozzle diaphragm
- ☐ (c) turbine blades
- ☐ (d) crossover connection

*If choice a is selected set score to 1.*

**106.** (2.7.4.0-2) In the illustration of a typical ship service turbo generator control system, the handle labeled "B" is used to \_\_\_\_\_. Illustration SE-0009

- ☐ (a) pump up the lube oil manifold
- ☒ (b) reset the over speed trip
- ☐ (c) bypass the governor control
- ☐ (d) roll over the high speed pinion

*If choice b is selected set score to 1.*

**107.** (2.7.4.0-3) Which of the following statements concerning the design of balanced throttle valves is correct?

- ☐ (a) The ahead throttle valve normally utilizes a guarding valve.
- ☐ (b) Both ahead and astern valves normally have a positive opening tendency.
- ☒ (c) They commonly use a conventional valve disc and a balance piston.
- ☐ (d) They commonly use two parallel seats and a balance cylinder.

*If choice c is selected set score to 1.*

**108.** (2.7.4.1-1) A sequential lift, nozzle valve control bar on a turbo generator, utilizes which of the following operating principles?

- ☐ (a) A servomotor, mechanically connected to nozzle valve hand wheels, opens or closes the valves in accordance with the type of electrical signal received.
- ☒ (b) A lifting beam mechanism engages nozzle valve stems of varying lengths.
- ☐ (c) A hydraulic piston raises or lowers individual valves according to pressure received from a governor.
- ☐ (d) A hydraulic piston raises or lowers groups of valves according to pressure received from a governor.

*If choice b is selected set score to 1.*

**109.** (2.7.4.1-2) Which of the following statements represents the significance of the differential pressure existing between the nozzle block and steam chest of a turbo generator equipped with a lifting beam mechanism?

- ☐ (a) The pressure differential eliminates the possibility of valve binding in the lifting beam.
- ☐ (b) The pressure differential requires the installation of a special biasing spring to open the valves.
- ☒ (c) The pressure differential assists in seating the valves when the lifting beam is lowered.
- ☐ (d) The pressure differential necessitates the use of a special balance piston.

*If choice c is selected set score to 1.*

**110.** (2.7.4.1-3) Which of the following is used to hold the poppet valves closed in a turbo generators nozzle control speed regulator?

- ☐ (a) Oil pressure
- ☐ (b) Springs
- ☐ (c) Lifting beam
- ☒ (d) Steam pressure

*If choice d is selected set score to 1.*

**111.** (2.7.4.1-4) A motor driven synchronizing device, figure "D" shown in the illustration, operated from the generator switchboard, initiates fine adjustments to the steam turbine speed by directly \_\_\_\_\_. Illustration SE-0009

- ☐ (a) raising or lowering the nozzle block lifting beam
- ☒ (b) changing the vertical location of the pilot valve bushing
- ☐ (c) increasing or decreasing operating spring pressure
- ☐ (d) varying the pivot rod stroke length on the governor weight eccentric pad

*If choice b is selected set score to 1.*

**112.** (2.7.6.0-1) The maximum temperature rise of oil passing through any reduction gear set, or bearing, should not exceed \_\_\_\_\_.

- ☐ (a) 90°F (44.5°C)
- ☐ (b) 30°F (16.7°C)
- ☐ (c) 70°F (38.9°C)
- ☒ (d) 50°F (27.8°C)

*If choice d is selected set score to 1.*

**113.** (2.7.6.0-2) When the temperature of the main turbine lubricating oil is lowered, an increase will occur in the \_\_\_\_\_.

- ☐ (a) pour point
- ☒ (b) viscosity
- ☐ (c) flash point
- ☐ (d) concentration of contaminants

*If choice b is selected set score to 1.*



**114.** (2.7.6.0-3) In order to maintain the required lube oil temperature leaving a lube oil cooler, where an automatic bypass valve is not provided, which of the following operations is correct?

- (a) The cooling water discharge leaving the cooler is directly regulated.
- (b) The quantity of lube oil to the cooler is regulated.
- (c) The cooling water to the lube oil cooler is directly regulated to maintain the proper lube oil temperature.
- (d) The lube oil velocity from the cooler is regulated.

*If choice a is selected set score to 1.*

**115.** (2.7.6.0-4) In a pressure type main propulsion turbine lubrication system, the lube oil service pumps normally take suction from the main sump and discharge directly to the \_\_\_\_\_.

- (a) gravity feed tank
- (b) main thrust bearing
- (c) lube oil coolers
- (d) lube oil header

*If choice c is selected set score to 1.*

**116.** (2.7.6.0-5) To assure the main propulsion turbine bearings are receiving the proper lube oil supply, you should check the \_\_\_\_\_.

- (a) lube oil strainer magnets
- (b) flow through the sight glass at the bearing
- (c) bull's-eye in the gravity tank overflow
- (d) lube oil temperature at the cooler outlet

*If choice b is selected set score to 1.*

**117.** (2.7.6.0-6) The term 'separation' as used in oil purification refers to the removal of \_\_\_\_\_.

- (a) oil from its additives
- (b) solids from lube oil
- (c) acid contaminants from oil
- (d) water from a mixture of oil liquids

*If choice d is selected set score to 1.*

**118.** (2.7.6.0-7) If contaminated lube oil were allowed to settle undisturbed in a tank, into which layers would the contaminants separate?

- (a) Sediment on the bottom, oil in the middle, and water on top.
- (b) Water on the bottom, oil in the middle, and sediment on top.
- (c) Sediment on the bottom, water in the middle, and oil on top.
- (d) Water on the bottom, sediment in the middle, and oil on top.

*If choice c is selected set score to 1.*

**119.** (2.7.6.0-8) Lube oil cannot be efficiently filtered if it's \_\_\_\_\_.

- ☐ (a) pump capacity is greater than the system's needs
- ☒ (b) temperature is too low
- ☐ (c) viscosity index is too low
- ☐ (d) pump discharge pressure is higher than the system pressure

*If choice b is selected set score to 1.*

**120.** (2.7.6.0-9) According to the illustration, what is the normal function of the component shown?  
Illustration SE-0010

- ☐ (a) indicate the pressure and temperature of lube oil leaving a turbine bearing
- ☐ (b) indicate the pressure and flow of lube oil entering a turbine bearing
- ☐ (c) act as a final filter for oil entering a bearing
- ☒ (d) indicate the temperature and flow of lube oil leaving a turbine bearing

*If choice d is selected set score to 1.*

**121.** (2.7.6.0-10) A common method of preheating main turbine lube oil prior to rolling over the main unit would be to \_\_\_\_\_.

- ☐ (a) bypass the lube oil gravity tank
- ☐ (b) run both the lube oil pumps simultaneously
- ☒ (c) operate the lube oil purifier on the main lube oil sump
- ☐ (d) slightly increase gland sealing steam pressure

*If choice c is selected set score to 1.*

**122.** (2.7.6.0-11) Which of the following types of bearing lubrication schemes can carry the highest unit loading?

- ☐ (a) Ring lubricated
- ☐ (b) Disk lubricated
- ☒ (c) Pressure lubricated
- ☐ (d) Oil whip lubricated

*If choice c is selected set score to 1.*

**123.** (2.7.6.0-12) As lube oil absorbs moisture its dielectric strength can be expected to \_\_\_\_\_.

- ☐ (a) increase with a decrease in viscosity
- ☐ (b) increase with an increase in viscosity
- ☐ (c) remain the same
- ☒ (d) decrease

*If choice d is selected set score to 1.*

**124.** (2.7.6.1.1-1) Which of the following conditions is indicated by oil flowing through a lube oil gravity tank overflow sight glass?

- ☐ (a) Turbine bearing failure has occurred.
- ☐ (b) Insufficient oil is being pumped to the gravity tank.
- ☐ (c) Excessive oil is stored in the gravity tank.
- ☒ (d) Sufficient oil flow is being supplied to the gravity tank.

*If choice d is selected set score to 1.*

**125.** (2.7.6.1.1-2) The gravity tank in a gravity lube oil system serves to \_\_\_\_\_.

- ☐ (a) settle lube oil prior to purifying
- ☒ (b) maintain oil supply for several minutes to bearings should the lube oil service pump fail
- ☐ (c) store heated lube oil
- ☐ (d) supply the lube oil service pump with a positive suction head

*If choice b is selected set score to 1.*

**126.** (2.7.6.1.2-1) What type of lube oil cooler is shown in the illustration? GS-0122

- ☐ (a) Plate type
- ☒ (b) Shell-and-tube
- ☐ (c) Bundle and stack
- ☐ (d) Self venting

*If choice b is selected set score to 1.*

**127.** (2.7.6.1.2.2) During high speed operation of the main turbine propulsion unit, the heat absorbed by the lubricating oil is removed by the \_\_\_\_\_.

- ☐ (a) distillate cooler
- ☒ (b) lube oil cooler
- ☐ (c) lube oil purifier
- ☐ (d) sump vents

*If choice b is selected set score to 1.*

**128.** (2.7.6.1.2-3) Which of the following statements is true concerning lube oil coolers?

- ☒ (a) The pressure of the oil is greater than that of the cooling water.
- ☐ (b) Magnets are installed in the tube sheets to remove metal particles.
- ☐ (c) The pressure of the oil is less than that of the cooling water.
- ☐ (d) The temperature of the oil is less than that of the cooling water.

*If choice a is selected set score to 1.*

- 129.** (2.7.6.1.3-1) If the main and standby lube oil service pumps of the main engine fail while underway at sea, \_\_\_\_\_.
- (a) the turbine bearings will immediately fail
  - (b) emergency lubrication can be supplied through the use of the hand pump
  - (c) the reduction gear bearings will immediately fail
  - (d) an emergency supply of oil in the gravity tank will provide time to crash stop the turbine and gears

*If choice d is selected set score to 1.*

- 130.** (2.7.6.1.3-2) In a pressure type main propulsion turbine lubrication system, the lube oil service pumps normally take suction from the main sump and discharge directly to the \_\_\_\_\_.
- (a) main thrust bearing
  - (b) gravity feed tank
  - (c) lube oil header
  - (d) lube oil coolers

*If choice d is selected set score to 1.*

- 131.** (2.7.6.1.4-1) Magnets are installed in the main propulsion turbine lube oil strainers to attract metal particles released through wearing of the \_\_\_\_\_.
- (a) Babbitt bearings
  - (b) reduction gears
  - (c) turbine blades
  - (d) turbine labyrinth

*If choice b is selected set score to 1.*

- 132.** (2.7.6.1.4-2) As the speed of an oil lubricated ball bearing increases, fluid friction, due to churning, generates heat. This condition may be avoided by \_\_\_\_\_.
- (a) adding more lubricant until the ball bearings are completely covered with a layer of oil
  - (b) reducing the quantity of lubricant until only a mist of oil is present on the ball bearings
  - (c) maintaining a continuous fluid level over half of the outer race
  - (d) installing oil rings on the ball bearings

*If choice b is selected set score to 1.*

- 133.** (2.7.6.1.4-3) Which of the filters listed will deplete the additives in lubricating oil?
- (a) Extended area membrane filter
  - (b) Cloth bag extractor
  - (c) Absorbent filter
  - (d) Adsorbent filter

*If choice d is selected set score to 1.*

**134.** (2.7.6.1.4-4) Turbine lube oil suction strainer baskets have \_\_\_\_\_.

- ☐ (a) frame lined with wire cloth
- ☒ (b) coarse perforations
- ☐ (c) fine perforations
- ☐ (d) self-cleaning design

*If choice b is selected set score to 1.*

**135.** (2.7.6.1.4-5) One limiting problem of lube oil filters restricting their use in large lube oil systems is \_\_\_\_\_.

- ☐ (a) as the oil temperature fluctuates during load changes their effectiveness changes inversely to the temperature
- ☒ (b) the associated large pressure drop across the filter
- ☐ (c) they easily rupture at normal working pressures
- ☐ (d) the need to centrifuge the oil in addition to the use of the filter

*If choice b is selected set score to 1.*

**136.** (2.7.6.1.4-6) Fine metallic particles, which may originate from wear or failure of the lube oil service pump internal parts, are prevented from contaminating the bearings served by the lube oil system by \_\_\_\_\_.

- ☐ (a) the change of direction and settling action within the lube oil coolers
- ☐ (b) batch centrifuging the lube oil at least once a week
- ☐ (c) the settling action of solid matter in the gravity tank
- ☒ (d) use of the magnetic strainers in the lube oil service pump discharge piping

*If choice d is selected set score to 1.*

**137.** (2.7.6.2.0-1) Of the many impurities commonly found in marine lubricating oil, which of the following CANNOT be removed by a centrifugal purifier at normal operating speeds and temperatures?

- ☒ (a) Diesel fuel oil
- ☐ (b) Metal particles
- ☐ (c) Water
- ☐ (d) Carbon particles

*If choice a is selected set score to 1.*

**138.** (2.7.6.2.0-2) In order to obtain the best performance with a lube oil purifier, the lube oil inlet temperature should \_\_\_\_\_.

- ☐ (a) be equal to the normal lube oil cooler outlet temperature
- ☐ (b) never exceed the highest main engine bearing temperature
- ☒ (c) be maintained in a temperature range of 160°F to a maximum of 180°F
- ☐ (d) be equal to main lube oil sump temperature

*If choice c is selected set score to 1.*

**139.** (2.7.6.2.0-3) In the operation of a lube oil clarifier, the position of the oil-water interface should be \_\_\_\_\_.

- (a) non-existent
- (b) maintained by the number of disks in the disk stack
- (c) maintained by the ring dam
- (d) maintained by the diaphragm-type, weir control valve

*If choice a is selected set score to 1.*

**140.** (2.7.6.2.0-4) Which of the following statements concerning the operation of a lube oil purifier is correct?

- (a) They should be operated as slowly as possible to ensure a long service life.
- (b) They should be operated at maximum design speed and recommended operating capacity.
- (c) They should not be primed with water when operated as a separator.
- (d) They should be operated as clarifiers for optimum moisture removal.

*If choice b is selected set score to 1.*

**141.** (2.7.6.2.0-5) A centrifuge will satisfactorily remove which of the listed substances from lube oil?

- (a) Fuel oil
- (b) Diesel fuel
- (c) Carbon particles
- (d) Gasoline

*If choice c is selected set score to 1.*

**142.** (2.7.6.2.0-6) The water seal in a centrifuge, operating at normal speed, prevents the lube oil from discharging from the water outlet. Another function of the seal is to \_\_\_\_\_.

- (a) provide a means of 'washing' the oil as it passes through the bowl
- (b) provide an area for separated water to pass and create a path to remove the water from the bowl
- (c) develop permanent emulsions with the lube oil
- (d) keep the bowl at a temperature below that of the lube oil input

*If choice b is selected set score to 1.*

**143.** (2.7.6.2.0-7) In order to maintain the effectiveness of the lube oil centrifuge to remove water, the engineer in charge should \_\_\_\_\_.

- (a) have the centrifuge cleaned only once every 30 days
- (b) maintain the lube oil input temperature at a maximum of 110°F
- (c) take lube oil samples each week and place in clear containers for inspection
- (d) insure that the oil input is always twice the output capacity

*If choice c is selected set score to 1.*

**144.** (2.7.6.2.0-8) When water is removed from lube oil passing through a centrifugal purifier, the water removed will \_\_\_\_\_.

- ☐ (a) be retained in the bowl
- ☐ (b) force the diameter of the oil column within the bowl to be narrowed
- ☒ (c) displace an equal amount of water from the bowl seal
- ☐ (d) displace water from the heavy phase discharge port, but of an amount less than that removed from the oil

*If choice c is selected set score to 1.*

**145.** (2.7.6.2.1-1) One function of the disks, in a disk-type centrifugal purifier, is to divide the bowl space into many separate passages to \_\_\_\_\_.

- ☒ (a) minimize agitation of the oil-water mixture
- ☐ (b) increase hydraulic head needed for proper circulation
- ☐ (c) completely filter out suspended particles
- ☐ (d) prevent bowl spindle vibration

*If choice a is selected set score to 1.*

**146.** (2.7.6.2.1-2) The size of the discharge ring used for the efficient operation of a disk type purifier is dependent upon the \_\_\_\_\_.

- ☐ (a) viscosity of the oil being purified
- ☐ (b) rated capacity of that purifier
- ☐ (c) maximum design speed of that purifier
- ☒ (d) specific gravity of the oil being purified

*If choice d is selected set score to 1.*

**147.** (2.7.6.2.1-3) The disk stack and tubular shaft used in a lube oil centrifugal purifier is forced to rotate at bowl speed by \_\_\_\_\_.

- ☒ (a) the locating pin
- ☐ (b) wire springs
- ☐ (c) the drive pin
- ☐ (d) the use of an acme thread screw

*If choice a is selected set score to 1.*

**148.** (2.7.6.2.1-4) In a disk type centrifugal purifier, the contaminated oil enters the centrifuge \_\_\_\_\_.

- ☐ (a) through the neck of the top disk
- ☐ (b) through the funnel body
- ☒ (c) at the top through the regulating tube
- ☐ (d) at the bottom through the oil inlet

*If choice c is selected set score to 1.*

**149.** (2.7.6.2.1-5) In a disk-type lubricating oil purifier, \_\_\_\_\_.

- ☐ (a) all dirt and sludge are automatically discharged with the cooling water
- ☒ (b) deterioration of the bowl ring gasket will cause the purifier to lose its water seal
- ☐ (c) the purifier driving gears are lubricated by the reclaimed oil as it leaves the bowl
- ☐ (d) sealing water must never be supplied until after oil is fed to the unit

*If choice b is selected set score to 1.*

**150.** (2.7.6.2.2-1) Item "Q" in the illustration is used to \_\_\_\_\_. Illustration GS-0124

- ☐ (a) balance the force distribution of the three wing device
- ☐ (b) guide the oil to be cleaned along the inside of the bowl for discharge
- ☒ (c) establish the position of the three wing within the bowl
- ☐ (d) assist in breaking down surface tension and thereby increase separation of solids and liquids from the oil

*If choice c is selected set score to 1.*

**151.** (2.7.6.2.2-2) Clean oil leaves the centrifuge illustrated through item \_\_\_\_\_. Illustration GS-0124

- ☐ (a) N
- ☒ (b) X
- ☐ (c) V
- ☐ (d) K

*If choice b is selected set score to 1.*

**152.** (2.7.6.2.2-3) The rotating speed of the tubular bowl centrifuge is more than twice that of the disk type. The reason for this is \_\_\_\_\_.

- ☐ (a) the friction affecting rotation is not as significant with a narrow diameter bowl
- ☐ (b) a narrow diameter bowl is not effected as much by windage losses as a larger diameter bowl
- ☐ (c) the drag bushing is used to permit the higher speed of rotation
- ☒ (d) to produce a nearly equal magnitude of centrifugal force

*If choice d is selected set score to 1.*

**153.** (2.7.6.2.2-4) Water removed through centrifugal force in the illustrated unit is displaced from the bowl through \_\_\_\_\_. Illustration GS-0124

- ☒ (a) N
- ☐ (b) K
- ☐ (c) X
- ☐ (d) V

*If choice a is selected set score to 1.*



**154.** (2.7.6.2.2-5) The three wing device in the unit illustrated is maintained in its position by item \_\_\_\_\_. Illustration GS-0124

- (a) Q
- (b) O
- (c) P
- (d) R

*If choice a is selected set score to 1.*

**155.** (2.7.6.3-1) Oil supply pressure to the main lube oil header of a gravity feed lube oil system is \_\_\_\_\_.

- (a) the sum of the lube oil static head pressure and service pump discharge pressure
- (b) the difference between the lube oil static head pressure and service pump discharge pressure
- (c) the result of the height of the gravity tank above the manifold
- (d) equal to the service pump discharge pressure, since the static heads of the lines to and from the gravity tank cancel out one another

*If choice c is selected set score to 1.*

**156.** (2.7.6.3-2) Oil flowing through the sight glass in the line between the lube oil gravity tank and main sump indicates the \_\_\_\_\_.

- (a) lube oil pump is stopped
- (b) gravity tank is overflowing
- (c) lube oil suction strainer is clogged
- (d) lube oil sump is full

*If choice b is selected set score to 1.*

**157.** (2.7.6.3-3) Which of the following statements is true concerning the lube oil system shown in the illustration? Illustration SE-0011

- (a) The gravity tank directly provides the normal supply of oil to the turbines and gears.
- (b) The gravity tank overflow line leads directly to the lube oil sludge tank.
- (c) The three-way temperature control valve bypasses cooling water around or through the lubricating oil cooler to maintain the desired oil temperature.
- (d) The drains from lube oil coolers can be directed back to the main sump, the sludge tank or the lube oil purifier.

*If choice d is selected set score to 1.*

**158.** (2.7.6.3-4) In a gravity lube oil system, a sight glass is installed in a line near the operating platform. This line connects the \_\_\_\_\_.

- (a) bottom of the gravity tank and the lube oil headers
- (b) gravity tank overflow and the sump
- (c) gravity tank overflow and the lube oil headers
- (d) bottom of the gravity tank and the sump

*If choice b is selected set score to 1.*

**159.** (2.7.6.3-5) Which of the following statements about gravity type lube oil systems is correct?

- ☐ (a) Gravity tanks are fitted with an overflow alarm.
- ☐ (b) Any lube oil pump failure causes immediate damage to turbine bearings.
- ☒ (c) Gravity tank overflow lines are lead directly to the lube oil sump.
- ☐ (d) The discharge from the gravity tanks flows to the lube oil pump suction.

*If choice c is selected set score to 1.*

**160.** (2.7.6.3-6) On a ship equipped with a gravity type lube oil system, which of the conditions listed will occur FIRST if the main lube oil pump discharge pressure is lost?

- ☒ (a) An alarm will sound.
- ☐ (b) The astern throttle will immediately open.
- ☐ (c) Lube oil will be provided to the bearings and gears via the gravity tank overflow line.
- ☐ (d) All bearing oil pressure will be lost.

*If choice a is selected set score to 1.*

**161.** (2.7.6.3-7) After starting the main lube oil pump in a gravity-type lube oil system, you should verify that the gravity tanks are full by \_\_\_\_\_.

- ☐ (a) sounding the lube oil sump
- ☐ (b) sounding the gravity tanks
- ☒ (c) observing the overflow sight glass
- ☐ (d) observing the flow from the bearings

*If choice c is selected set score to 1.*

**162.** (2.7.6.3-8) In steam turbine and reduction gear units, lube oil coolers installed in the lube oil system are located between the \_\_\_\_\_.

- ☒ (a) lube oil pumps and gravity tanks
- ☐ (b) lube oil sump and lube oil pumps
- ☐ (c) gravity tanks and lube oil sump
- ☐ (d) gravity tanks and main unit

*If choice a is selected set score to 1.*

**163.** (2.7.6.3-9) In a steam turbine and reduction gear main propulsion plant, the alarm sensor for low turbine oil pressure is usually installed \_\_\_\_\_.

- ☐ (a) at a point on the inlet side of the main bearings as close to the bearings as possible
- ☐ (b) at a point on the outlet side of the main bearings as close to the bearings as possible
- ☐ (c) at the outlet of the main thrust bearing
- ☒ (d) at the end of the supply line header to the bearings

*If choice d is selected set score to 1.*

**164.** (2.7.6.4-1) Water retained in the lube oil system of a main propulsion turbine installation is undesirable because it \_\_\_\_\_.

- (a) causes pitting of the gear teeth
- (b) raises the flash point of the oil to a dangerously high level
- (c) causes the turbine to over speed
- (d) results in excessive cooling of bearing surfaces

*If choice a is selected set score to 1.*

**165.** (2.7.6.4-2) If a lube oil pump fails to build up discharge pressure, the cause could be the \_\_\_\_\_.

- (a) bypass valve is closed
- (b) discharge valve is open
- (c) suction valve is closed
- (d) suction vacuum is high

*If choice c is selected set score to 1.*

**166.** (2.7.6.4-3) When the flow of oil admitted to a disk-type centrifugal purifier is in excess of its designed capacity, which of the following conditions will usually occur?

- (a) The oil will be discharged through the heavy phase discharge port.
- (b) The speed of the centrifuge will increase.
- (c) All water will be retained by the purified oil being discharged.
- (d) Oil will be present in the water sealing line to the bowl.

*If choice a is selected set score to 1.*

**167.** (2.7.6.4-4) While a vessel is underway, which of the conditions listed would indicate a leak in the lube oil cooler?

- (a) Contamination of the lube oil.
- (b) Excessive lube oil consumption.
- (c) Corrosion of the journals and bearings.
- (d) Excessive water discharge rate from the lube oil purifier.

*If choice b is selected set score to 1.*

**168.** (2.7.6.4-5) Which of the following conditions may exist if you detect an excessive amount of metal particles on a main engine lube oil strainer magnet?

- (a) Turbine shrouding damage.
- (b) Main shaft bearing damage.
- (c) Reduction gear damage.
- (d) Journal bearing damage.

*If choice c is selected set score to 1.*

**169.** (2.7.6.4-6) The maximum lube oil temperature leaving a large, main propulsion steam turbine bearing should \_\_\_\_\_.

- (a) be always maintained at 130° F
- (b) not exceed the normal lube oil outlet temperature from the centrifugal purifier
- (c) never exceed 170°F
- (d) never exceed the inlet temperature by more than 70°F

*If choice c is selected set score to 1.*

**170.** (2.7.6.4-7) A cloudy or milky appearing lube oil sample, taken from the main lubricating oil system could be caused by \_\_\_\_\_.

- (a) insufficient cooling water to the lube oil cooler
- (b) insufficient gland sealing steam
- (c) excessive cooling water to the lube oil cooler
- (d) excessive gland sealing steam

*If choice d is selected set score to 1.*

**171.** (2.7.6.4-8) Which of the following problems will occur if a manually cleaned disk-type centrifugal lube oil purifier contains insufficient sealing water prior to admitting oil flow to the bowl?

- (a) Lube oil will discharge from the heavy phase discharge port to the sludge tank.
- (b) The lube oil will not be subjected to the proper centrifugal force.
- (c) Contamination of the lube oil by emulsification will result.
- (d) The lube oil will overheat and flash.

*If choice a is selected set score to 1.*

**172.** (2.7.6.4-9) If saltwater leaks into and contaminates the main lubricating oil system, which of the following remedial actions should be taken?

- (a) Run the engines at idle and prevent the circulation of contaminated oil.
- (b) Disengage the jacking gear and allow contaminated oil to cool to engine room temperature.
- (c) Seal off the leak and promptly remove and replace all contaminated oil from the system.
- (d) Locate the leak and seal it off when time permits.

*If choice c is selected set score to 1.*

**173.** (2.7.6.4-10) Which of the following would contribute to the formation of an oil and water emulsion, in addition to acid formation?

- (a) Aeration, agitation, and heat
- (b) Solid insoluble particles, aeration, and heat
- (c) Water and solid insoluble particles
- (d) Water, agitation, and heat

*If choice d is selected set score to 1.*

**174.** (2.7.7.0-1) The slight wavy appearance of the tips of reduction gear teeth is a result of \_\_\_\_\_.

- (a) the method of manufacture and does affect normal operation
- (b) insufficient lube oil pressure
- (c) uneven bearing wear due to gross misalignment
- (d) high lube oil temperatures

*If choice a is selected set score to 1.*

**175.** (2.7.7.1-1) Which of the following types of bearings are used as line shaft bearings?

- (a) Rigidly mounted, radial sleeve
- (b) Segmental, pivoted-shoe thrust
- (c) Tapered roller, split type radial
- (d) Ring-oiled, Babbitt-faced, spherical seat, shell

*If choice d is selected set score to 1.*

**176.** (2.7.7.1-2) Which of the following methods is used to securely fasten the Babbitt lining of a reduction gear bearing to its shell?

- (a) The Babbitt is securely bonded to the shell by the pressure of the hydrodynamic oil wedge.
- (b) The Babbitt has a crescent shaped pocket cast symmetrically about the bearing split.
- (c) The Babbitt is relieved in way of the split and held in place by locking pins.
- (d) The Babbitt is centrifugally spun into the bearings or cast under a pressure head.

*If choice d is selected set score to 1.*

**177.** (2.7.7.1-3) Babbitt is a metal alloy commonly used for lining \_\_\_\_\_.

- (a) saltwater piping
- (b) valve seats
- (c) shim stock
- (d) precision bearings

*If choice d is selected set score to 1.*

**178.** (2.7.7.1-4) Which of the following construction methods would apply to the Babbitt lined, split-type, reduction gear bearings?

- (a) They are secured in their housing so pressure points will occur at the joint faces.
- (b) They are split into four equal sized segments.
- (c) They are always mounted with the split in a horizontal plane.
- (d) They are rigidly mounted and dowelled in their housings.

*If choice d is selected set score to 1.*

**179.** (2.7.7.1-5) The splits located in the halves of main reduction gear bearings are aligned at an angle to the horizontal in order to resist \_\_\_\_\_.

- (a) wiping
- (b) steam loss
- (c) axial stress
- (d) oil loss

*If choice a is selected set score to 1.*

**180.** (2.7.7.1-6) Chamfers, located at the parting edges of horizontal split sleeve type bearings, are used to facilitate oil storage and distribution. They are machined \_\_\_\_\_.

- (a) radially the full length of the bearing
- (b) radially, to within 45 degrees of the normal bearing surface
- (c) axially the full length of the bearing
- (d) axially, approaching but not extending to the end of the bearing

*If choice d is selected set score to 1.*

**181.** (2.7.7.1-7) Most main propulsion reduction gear bearings are \_\_\_\_\_.

- (a) self-aligning, solid bushings
- (b) rigidly mounted, Babbitt lined, split type
- (c) spherical-seated, tapered roller type
- (d) self-lubricating, sealed, roller ball type

*If choice b is selected set score to 1.*

**182.** (2.7.7.2-1) Which of the devices listed is commonly used to compensate for the expansion and minor misalignments occurring between the main turbine rotor and the reduction gear?

- (a) Quill shaft
- (b) Expansion gear
- (c) Sliding sleeve
- (d) Gear type flexible coupling

*If choice d is selected set score to 1.*

**183.** (2.7.7.2-2) Axial movement in a gear-type flexible coupling is provided for by \_\_\_\_\_.

- (a) adjusting the pitch of the teeth on the pinion and high speed gears
- (b) the variable oil clearance in the quill shaft
- (c) gear teeth on the floating member sliding between internal teeth on the shaft ring
- (d) each gear sliding on its shaft between retaining collars

*If choice c is selected set score to 1.*

**184.** (2.7.7.2-3) Which of the following statements is true concerning the coupling shown in the illustration? Illustration SE-0001

- ☐ (a) It is commonly used between the first reduction pinion and the second reduction gear.
- ☐ (b) It is suitable for use on small auxiliary turbines only.
- ☐ (c) It allows for any misalignment between the main turbine and the second reduction gear.
- ☒ (d) It can be used to connect the main turbine to the high-speed pinion.

*If choice d is selected set score to 1.*

**185.** (2.7.7.2-4) Which of the coupling types listed is shown in the illustration? Illustration SE-0001

- ☐ (a) Claw
- ☐ (b) Pin
- ☒ (c) Gear
- ☐ (d) Solid

*If choice c is selected set score to 1.*

**186.** (2.7.7.2-5) The part shown in the illustration would be located between which of the following components of a modern geared turbine main propulsion unit? Illustration SE-0001

- ☐ (a) Between the bull gear and line shaft on the side of the gear opposite the thrust bearing.
- ☒ (b) Between the rotors and high-speed pinions of the high pressure and low pressure turbines.
- ☐ (c) Between the bull gear and line shaft on the thrust bearing side of the gear.
- ☐ (d) Between the first reduction gears and high-speed pinions of the high pressure and low pressure turbines.

*If choice b is selected set score to 1.*

**187.** (2.7.7.2-6) On main turbine propulsion units, gear type flexible couplings are generally used between the \_\_\_\_\_.

- ☐ (a) quill shaft and high speed pinion
- ☐ (b) second reduction and the shaft thrust bearing
- ☒ (c) rotor shaft and pinion shaft
- ☐ (d) rotor shaft and quill shaft

*If choice c is selected set score to 1.*

**188.** (2.7.7.3-1) The component shown in the illustration, labeled "I", is the \_\_\_\_\_. SE-0013

- ☐ (a) first reduction pinion
- ☒ (b) first reduction gear
- ☐ (c) second reduction pinion
- ☐ (d) second reduction gear

*If choice b is selected set score to 1.*

**189.** (2.7.7.3-2) The purpose of the main reduction gears is to \_\_\_\_\_.

- ☐ (a) reduce engine room noise levels during high speed operations
- ☐ (b) transmit vibration and thrust to the ship's hull
- ☒ (c) reduce high turbine RPM to an efficient propeller RPM
- ☐ (d) provide a means of reversing the main engines in an emergency

*If choice c is selected set score to 1.*

**190.** (2.7.7.3-3) The component shown in the illustration, labeled "IV", is the \_\_\_\_\_. SE-0013

- ☒ (a) bull gear
- ☐ (b) high speed pinion
- ☐ (c) first reduction gear
- ☐ (d) low speed pinion

*If choice a is selected set score to 1.*

**191.** (2.7.7.3-4) What is the significance of pinion deflection in the operation of reduction gears?

- ☒ (a) Pinion deflection causes unequal tooth loading.
- ☐ (b) Deflection is minimal because a longer pinion is more rigid.
- ☐ (c) Deflection causes excessive wear at the center of the pinion.
- ☐ (d) Deflection causes excessive wear at both ends of the pinion.

*If choice a is selected set score to 1.*

**192.** (2.7.7.3-5) After the housing has been bolted down, the final check of reduction gear tooth contact is usually made by \_\_\_\_\_.

- ☐ (a) dial indicators
- ☐ (b) alignment gauges
- ☐ (c) bridge gauges
- ☒ (d) bluing the teeth

*If choice d is selected set score to 1.*

**193.** (2.7.7.3-6) The component labeled "II", as shown in the illustration is called the \_\_\_\_\_.  
Illustration SE-0013

- ☐ (a) first reduction gear
- ☒ (b) high speed pinion
- ☐ (c) second reduction pinion
- ☐ (d) second reduction gear

*If choice b is selected set score to 1.*



**194.** (2.7.7.3-7) The component shown in the illustration, labeled "III", is the \_\_\_\_\_. Illustration SE-0013

- ☐ (a) first reduction gear
- ☐ (b) second reduction gear
- ☒ (c) low speed pinion
- ☐ (d) high speed pinion

*If choice c is selected set score to 1.*

**195.** (2.7.7.3-8) The reduction gear shown in the illustration is a/an \_\_\_\_\_. Illustration SE-0013

- ☐ (a) locked-train double reduction gear
- ☐ (b) nested four-step reduction gear
- ☐ (c) nested double reduction gear
- ☒ (d) articulated double reduction gear

*If choice d is selected set score to 1.*

**196.** (2.7.7.3-9) Which of the following statements defines the term 'axial float' in reference to reduction gears?

- ☐ (a) The gears are capable of free motion, neither supporting nor being supported radially by other gears.
- ☐ (b) The gears cut with a single helical profile have axial thrust eliminated.
- ☐ (c) The gears are not subject to excessive tooth loads due to mismatching of the journal bearing halves.
- ☒ (d) A pinion is capable of free axial motion, mating with a fixed double helical gear which establishes its position in the gear train.

*If choice d is selected set score to 1.*

**197.** (2.7.7.3-10) A ship is equipped with the illustrated turbine gear set and a right hand turning propeller. When steam is admitted to the astern element, with sternway on, the high-speed gear on the high pressure side is \_\_\_\_\_. Illustration SE-0016

- ☐ (a) turning counter clockwise as viewed from the aft end of the reduction gear.
- ☐ (b) turning opposite to the rotation of the high-speed gear on the low pressure side.
- ☐ (c) turning the same rotation of the high-speed pinion on the low pressure side.
- ☒ (d) rotating the same direction as the low-speed pinion on the low pressure side.

*If choice d is selected set score to 1.*

**198.** (2.7.7.4-1) As found in a reduction gear drive system, thrust bearings serve to \_\_\_\_\_.

- ☐ (a) increase the shaft speed
- ☐ (b) limit the radial movement of the shaft
- ☒ (c) transmit the force produced by the propeller to the structure of the ship
- ☐ (d) hold the main engine in place

*If choice c is selected set score to 1.*

**199.** (2.7.7.4-2) In the thrust bearing assembly illustrated the total oil clearance can be correctly decreased by \_\_\_\_\_. Illustration SE-0007

- ☐ (a) increasing the thickness of the filler piece
- ☒ (b) decreasing the thickness of the adjusting ring
- ☐ (c) decreasing the thickness of the filler piece
- ☐ (d) increasing the thickness of the adjusting ring

*If choice b is selected set score to 1.*

**200.** (2.7.7.4-3) In the diagrammatic arrangement of the thrust bearing, shown in the illustration, the direction of shaft rotation and the direction of thrust are indicated respectively by arrows \_\_\_\_\_. Illustration SE-0012

- ☐ (a) F and H
- ☐ (b) G and J
- ☒ (c) F and J
- ☐ (d) G and H

*If choice c is selected set score to 1.*

**201.** (2.7.7.4-4) The base ring shown in the illustration is identified by the letter \_\_\_\_\_. Illustration SE-0012

- ☒ (a) D
- ☐ (b) E
- ☐ (c) C
- ☐ (d) A

*If choice a is selected set score to 1.*

**202.** (2.7.7.4-5) A Kingsbury, or pivot shoe type thrust bearing, can bear much greater loads per square inch of working surface than can parallel surface bearings because provisions are made in the Kingsbury bearing \_\_\_\_\_.

- ☐ (a) for automatically adjusting clearances to the correct value when wear occurs
- ☐ (b) for adjusting the filler piece thickness behind the pivotal-shoes to give a more accurate fit
- ☐ (c) to allow the leveling plates to pivot on the collar when thrust loads are applied
- ☒ (d) for the shoes to tilt slightly, thereby allowing the formation of a wedge shaped oil film under a thrust load

*If choice d is selected set score to 1.*

**203.** (2.7.7.5-1) Which of the statements listed applies to the quill shaft shown in the illustration?  
Illustration SE-0005

- ☐ (a) It absorbs the axial thrust generated by the meshing gears.
- ☒ (b) It permits axial movement between the high speed gear and low speed pinion.
- ☐ (c) It compensates for high speed pinion radial misalignment.
- ☐ (d) It provides torsional rigidity to help maintain alignment between gear train and the turbine rotor.

*If choice b is selected set score to 1.*

**204.** (2.7.7.6-1) Which of the following operational practices is helpful in avoiding the accumulation of condensate in the main reduction gear casing?

- ☒ (a) After the main unit is secured, lubricating oil should be circulated until the temperature of the oil and reduction gear casing approximates the engine room temperature.
- ☐ (b) Always ensure that the lubricating oil pressure is 14-17 psi when operating in unusually cold waters.
- ☐ (c) Avoid applying gland sealing steam to the low pressure turbine until you are ready to start up the first-stage air ejector.
- ☐ (d) The temperature of the lubricating oil should not exceed the gear manufacturer's recommendation when the unit is operating at full load.

*If choice a is selected set score to 1.*

**205.** (2.7.7.6-2) The most practical method of determining the condition of a shaft bearing while the shaft is in operation is to \_\_\_\_\_.

- ☐ (a) perform a carbon blot test on an oil sample from the bearing
- ☒ (b) check the lube oil temperature
- ☐ (c) check the lube oil viscosity
- ☐ (d) visually inspect the bearing

*If choice b is selected set score to 1.*

**206.** (2.7.7.6-3) Which of the listed operational checks should be made "continuously" on the main propulsion reduction gears?

- ☐ (a) Check radial bearing wear.
- ☐ (b) Inspect alignment between gears and turbine.
- ☐ (c) Check teeth for pitting and scuffing.
- ☒ (d) Check bearing lube oil temperatures.

*If choice d is selected set score to 1.*

**207.** (2.7.7.7-1) Which immediate action should you take when the temperature of one line shaft bearing increases above its normal operating temperature?

- ☒ (a) Check the bearing for proper lubrication.
- ☐ (b) Stop the unit and replace the bearing.
- ☐ (c) Check for proper water circulation to the lube oil coolers.
- ☐ (d) Stop the unit and carefully inspect the bearing.

*If choice a is selected set score to 1.*

**208.** (2.7.7.7-2) The most practical method of determining the condition of a shaft bearing while the shaft is in operation is to \_\_\_\_\_.

- ☐ (a) perform a carbon blot test on an oil sample from the bearing
- ☐ (b) check the lube oil viscosity
- ☒ (c) check the lube oil temperature
- ☐ (d) visually inspect the bearing

*If choice c is selected set score to 1.*

**209.** (2.7.7.7-3) Which of the following would cause the dowel or locking lip of a split-type, precision insert, main bearing to shear and allow the bearing to rotate with the journal?

- ☐ (a) Short periods of above normal operating speeds
- ☐ (b) Excessive bearing bolt torque
- ☐ (c) Unequal torque to any two adjacent bearing bolts
- ☒ (d) Insufficient bearing crush

*If choice d is selected set score to 1.*

**210.** (2.7.7.7-4) If a line shaft bearing begins to overheat, the shaft speed should be reduced. If overheating persists, you should then \_\_\_\_\_.

- ☒ (a) apply emergency cooling water externally to the bearing
- ☐ (b) decrease lube oil pressure to the bearing
- ☐ (c) increase lube oil pressure to the bearing
- ☐ (d) flood the bearing with a higher viscosity oil to provide emergency lubrication and cooling

*If choice a is selected set score to 1.*

**211.** (2.7.8.1-1) What is the FIRST thing that will happen if both the main and standby lube oil pumps fail on a geared main propulsion turbine operating at full sea speed?

- (a) Vacuum will be lost.
- (b) Ahead throttle will close.
- (c) Lube oil sump will overflow.
- (d) HP turbine bearings will overheat.

*If choice b is selected set score to 1.*

**212.** (2.7.8.2-1) While a vessel is underway the low pressure turbine high-speed pinion is damaged. The pinion is then removed from the gear train. Under these circumstances, the main unit is capable of which speed and direction?

- (a) Reduced speed ahead only
- (b) Reduced speed ahead and full speed astern
- (c) Reduced speed astern and full speed ahead
- (d) Reduced speed astern only

*If choice a is selected set score to 1.*

**213.** (2.7.9-1) Precautions to be observed prior to starting a turbine driven cargo pump, should include \_\_\_\_\_.

- (a) observing the operation of the over speed trip
- (b) checking the manual trip device for proper operation
- (c) assuring that the turbine casing drains are wired closed
- (d) open all governor oil relay drains

*If choice b is selected set score to 1.*

1. (3.7.1.1.1-1) The boiler wrapper sheet, shown in the illustration, is indicated by arrow \_\_\_\_\_.  
Illustration SG-0007

- ☐ (a) A
- ☐ (b) H
- ☒ (c) B
- ☐ (d) I

*If choice c is selected set score to 1.*

2. (3.7.1.1.1-2) In what section of a boiler would you find a steam quality of 90%?

- ☒ (a) Steam drum
- ☐ (b) Desuperheater outlet
- ☐ (c) Superheater outlet
- ☐ (d) Last pass of the superheater

*If choice a is selected set score to 1.*

3. (3.7.1.1.1-3) Steam baffles are used in the steam drum of a water-tube boiler to \_\_\_\_\_.

- ☒ (a) reduce the possibility of carryover
- ☐ (b) support the drum safety valve nozzles
- ☐ (c) remove boiler water dirt deposits
- ☐ (d) extend the internal feed pipe

*If choice a is selected set score to 1.*

4. (3.7.1.1.1-4) The internal feed pipe in a D-type marine boiler \_\_\_\_\_.

- ☒ (a) distributes feed water evenly throughout the steam drum
- ☐ (b) is drilled with holes to provide even distribution of boiler feed water chemicals
- ☐ (c) is located well above the normal steam drum water level to assist in deaeration of feed water
- ☐ (d) guides the feed water toward the downcomer tubes

*If choice a is selected set score to 1.*

5. (3.7.1.1.1-5) Which of the following statements represents the purpose of boiler sliding feet?

- ☐ (a) To ensure an airtight seal between the boiler inner and outer casings.
- ☐ (b) To compensate for deflection of the hull in way of the boiler supports.
- ☒ (c) To accommodate the changing length of the water drum as it expands or contracts with temperature changes.
- ☐ (d) To allow for unequal expansion between the wrapper and tube sheets.

*If choice c is selected set score to 1.*

6. (3.7.1.1.2-1) Which area shown in the illustration will offer the most resistance to heat transfer from the fireside to the waterside of a boiler tube? SG-0017

- ☐ (a) D
- ☐ (b) E
- ☐ (c) C
- ☒ (d) B

*If choice d is selected set score to 1.*

7. (3.7.1.1.2-2) Under what operating conditions may water wall header drains be used for blow down?

- ☐ (a) When it is necessary for rapid drainage of the boiler.
- ☐ (b) During periods of carryover in the steam drum.
- ☒ (c) Only if the fires are secured and no steam is being generated.
- ☐ (d) When the water level is out of sight in the gage glass.

*If choice c is selected set score to 1.*

8. (3.7.1.1.2-3) In the boiler shown in the illustration, the arrow "E" indicates a \_\_\_\_\_. SG-0008

- ☐ (a) support tube
- ☐ (b) recirculating tube
- ☒ (c) downcomer
- ☐ (d) water wall tube

*If choice c is selected set score to 1.*

9. (3.7.1.1.2-4) One advantage of installing water wall tubes in a boiler furnace is to \_\_\_\_\_.

- ☒ (a) decrease refractory maintenance
- ☐ (b) reduce combustion rates
- ☐ (c) increase furnace size
- ☐ (d) reduce furnace temperature

*If choice a is selected set score to 1.*

10. (3.7.1.1.2-5) In most marine boilers, the primary reason the first few rows of generating tubes, called screen or furnace row tubes, are made larger in diameter than the rest of the generating tubes is because \_\_\_\_\_.

- ☒ (a) they require more water flow since they are exposed to the greatest heat
- ☐ (b) they must screen the superheater from the direct radiant heat of the burners
- ☐ (c) they must act as downcomers to ensure proper circulation
- ☐ (d) their main function is to retard combustion gas flow for maximum heat transfer rates

*If choice a is selected set score to 1.*

11. (3.7.1.1.3-1) The boiler superheater shown in the illustration is a/an \_\_\_\_\_. SG-0007

- ☐ (a) overdeck convection-type
- ☐ (b) overdeck integral-type
- ☐ (c) horizontal U-type
- ☒ (d) vertical U-type

*If choice d is selected set score to 1.*

12. (3.7.1.1.3-2) Where is the superheater located in the boiler shown in the illustration? SG-0008

- ☐ (a) I
- ☐ (b) J
- ☐ (c) H
- ☒ (d) G

*If choice d is selected set score to 1.*

13. (3.7.1.1.3-3) The purpose of the division plates installed in boiler superheater headers is to \_\_\_\_\_.

- ☐ (a) limit the maximum temperature rise of the superheater outlet to 15°F
- ☒ (b) ensure proper steam flow, thus preventing 'short circuiting' of superheater loops
- ☐ (c) provide a means of controlling steam passage in response to throttle demands
- ☐ (d) all of the above

*If choice b is selected set score to 1.*

14. (3.7.1.1.3-4) Which of the devices listed is shown in the boiler illustration? SG-0008

- ☐ (a) Regenerative air heater
- ☐ (b) Separately fired superheater
- ☐ (c) Retractable soot blower
- ☒ (d) Integral or interdeck superheater

*If choice d is selected set score to 1.*

15. (3.7.1.1.3-5) The items labeled "D" and "M" as indicated on the illustration are commonly called \_\_\_\_\_.

- ☒ (a) mica sheets
- ☐ (b) glass inserts SG-0020
- ☐ (c) cork gaskets
- ☐ (d) face plates

*If choice a is selected set score to 1.*



16. (3.7.1.1.4-1) The device shown in the illustration is a/an \_\_\_\_\_. SG-0013

- ☐ (a) deaerator
- ☒ (b) desuperheater
- ☐ (c) eductor
- ☐ (d) air ejector

*If choice b is selected set score to 1.*

17. (3.7.1.1.4-2) Desuperheated steam can be found at the \_\_\_\_\_.

- ☐ (a) main steam stop
- ☐ (b) generator steam stop
- ☒ (c) spray attemperator outlet
- ☐ (d) high pressure turbine steam chest

*If choice c is selected set score to 1.*

18. (3.7.1.1.4-3) Which of the following locations could desuperheated steam be considered to occur?

- ☐ (a) Spray attemperator
- ☐ (b) Main engine extractions
- ☒ (c) Both "A" and "B"
- ☐ (d) Neither "A" nor "B"

*If choice c is selected set score to 1.*

19. (3.7.1.1.4-4) The primary purpose of a control desuperheater installed in the steam drum of a boiler is to \_\_\_\_\_.

- ☒ (a) regulate the superheater outlet temperature by cooling a portion of the superheated steam
- ☐ (b) regulate saturated steam temperature through the desuperheater
- ☐ (c) regulate the temperature of superheated steam by adding moisture
- ☐ (d) assure a constant volume of steam flow through the entire superheater under all load conditions

*If choice a is selected set score to 1.*

20. (3.7.1.1.4-5) Which of the devices listed is indicated by arrow "H" shown in the illustration? SG-0008

- ☒ (a) Economizer
- ☐ (b) Steam soot blowers
- ☐ (c) Overdeck superheater
- ☐ (d) Air heater

*If choice a is selected set score to 1.*

**21.** (3.7.1.1.5-1) The minimum feed water inlet temperature to a boiler economizer is determined by the \_\_\_\_\_.

- ☐ (a) radiant heat transfer in the furnace
- ☒ (b) dew point temperature of the stack gas
- ☐ (c) superheater outlet temperature
- ☐ (d) surface area of the third stage heater

*If choice b is selected set score to 1.*

**22.** (3.7.1.1.5-2) Boiler fuel savings gained by the use of an economizer can amount to \_\_\_\_\_.

- ☐ (a) one half percent for each 15°F rise in feed water temperature
- ☐ (b) three percent for each 5°F rise in feed water temperature
- ☒ (c) one percent for each 10°F rise in feed water temperature
- ☐ (d) three percent for each 20°F rise in feed water temperature

*If choice c is selected set score to 1.*

**23.** (3.7.1.1.5-3) Which of the conditions listed could cause steam formation in the economizer?

- ☐ (a) Soot buildup on the gill rings.
- ☐ (b) An open main feed pump recirculating line.
- ☐ (c) Excessive water flow rates.
- ☒ (d) Sudden large increase in the firing rate.

*If choice d is selected set score to 1.*

**24.** (3.7.1.1.5-4) The boiler economizer provides additional heat to the \_\_\_\_\_.

- ☐ (a) steam leaving the superheater
- ☐ (b) air supply entering the furnace
- ☐ (c) fuel oil entering the furnace
- ☒ (d) feed water entering the boiler

*If choice d is selected set score to 1.*

**25.** (3.7.1.1.5-5) A check valve is located between the economizer and the steam drum to \_\_\_\_\_.

- ☒ (a) prevent steam and water flow reversal from the drum should an economizer casualty occur
- ☐ (b) assure a positive feed water flow to the steam drum
- ☐ (c) prevent the feed pump from becoming vapor bound
- ☐ (d) assure a positive feed water flow through the economizer

*If choice a is selected set score to 1.*

**26.** (3.7.1.1.5-6) One factor for determining the minimum feed water inlet temperature to a boiler economizer is the \_\_\_\_\_.

- ☐ (a) superheater inlet temperature
- ☒ (b) dew point temperature of the stack gases
- ☐ (c) temperature of steam bled off the LP turbine
- ☐ (d) desuperheater outlet temperature

*If choice b is selected set score to 1.*

**27.** (3.7.1.1.6-1) Which of the listed refractory materials can be used in an area directly exposed to the highest heat in the furnace?

- ☐ (a) Baffle mix
- ☐ (b) Insulating block
- ☐ (c) Insulating brick
- ☒ (d) Firebrick

*If choice d is selected set score to 1.*

**28.** (3.7.1.1.6-2) In a regenerative air heater, air is bypassed around the heater while \_\_\_\_\_.

- ☒ (a) operating at low steaming rates
- ☐ (b) giving a surface blow
- ☐ (c) blowing tubes
- ☐ (d) crossing over forced draft fans

*If choice a is selected set score to 1.*

**29.** (3.7.1.1.7-1) When heated, brickwork in a boiler is kept from buckling by the installation of \_\_\_\_\_.

- ☐ (a) insulating bricks
- ☐ (b) insulating blocks
- ☒ (c) expansion joints
- ☐ (d) sliding saddles

*If choice c is selected set score to 1.*

**30.** (3.7.1.1.7-2) Which of the listed refractory materials is composed of wool fibers and clay binders?

- ☒ (a) Insulating cement
- ☐ (b) Castable fireclay
- ☐ (c) Chrome castable ore
- ☐ (d) All of the above

*If choice a is selected set score to 1.*

**31.** (3.7.1.1.7-3) According to the illustration of a typical boiler furnace rear wall, which item number would best represent "insulating block"? Illustration SG-0003

- ☐ (a) 3
- ☐ (b) 1
- ☐ (c) 2
- ☒ (d) 7

*If choice d is selected set score to 1.*

**32.** (3.7.1.1.7-4) Boiler refractory firebrick is secured to the casing by \_\_\_\_\_.

- ☒ (a) slots in the brick engaging anchor bolts
- ☐ (b) fast drying plastic refractory mortar
- ☐ (c) high strength tensile fasteners
- ☐ (d) studding on the water wall tubes

*If choice a is selected set score to 1.*

**33.** (3.7.1.1.7-5) Boiler refractory previously baked out and fired is most sensitive to \_\_\_\_\_.

- ☐ (a) radiant heat of the burner
- ☐ (b) rapid heating
- ☐ (c) sustained high furnace temperature
- ☒ (d) rapid cooling

*If choice d is selected set score to 1.*

**34.** (3.7.1.1.8-1) Which of the listed types of safety valves is shown in the illustration? Illustration SG-0018

- ☒ (a) Huddling chamber type
- ☐ (b) Pressure-loaded type
- ☐ (c) Jet flow type
- ☐ (d) Nozzle reaction type

*If choice a is selected set score to 1.*

**35.** (3.7.1.1.8-2) On a boiler safety valve, the blow down adjusting ring is locked in place by a \_\_\_\_\_.

- ☐ (a) wire seal
- ☐ (b) locknut
- ☒ (c) set screw
- ☐ (d) cotter pin

*If choice c is selected set score to 1.*

**36.** (3.7.1.1.8-3) What is the primary operational difference between a nozzle reaction safety valve and a huddling chamber safety valve?

- (a) The principle by which blow down is accomplished.
- (b) The manner in which lifting pressure is adjusted.
- (c) The difference in valve relieving capacities.
- (d) The manner in which steam pressure causes initial valve opening.

*If choice a is selected set score to 1.*

**37.** (3.7.1.1.8-4) When excessive static boiler pressure has resulted in the initial lift of the valve disc, a huddling chamber safety valve will continue to lift open as a result of \_\_\_\_\_,

- (a) steam pressure acting on the enlarged area of projecting lip or ring
- (b) the resulting reactive force created by the rapid expansion of escaping steam
- (c) an increase in steam velocity through an adjustable orifice ring
- (d) steam pressure transmitted through a pipe connected to the superheater outlet

*If choice a is selected set score to 1.*

**38.** (3.7.1.2.1-1) Scavenging air lines are connected to boiler stack periscopes to \_\_\_\_\_.

- (a) prevent stack gases from contaminating the periscopes internal components
- (b) maintain a negative pressure in the periscope line
- (c) keep the mirrors from misaligning
- (d) keep the periscope tubing from warping

*If choice a is selected set score to 1.*

**39.** (3.7.1.2.1-2) Which type of waterside deposits can normally be removed by chemically boiling out a boiler?

- (a) Sludge
- (b) High temperature oxide
- (c) Corrosion deposits
- (d) Oil

*If choice d is selected set score to 1.*

**40.** (3.7.1.2.1-3) Steam line water hammer can be best prevented by \_\_\_\_\_.

- (a) always opening steam valves rapidly
- (b) replacing all 90° Elbows with capped tees
- (c) keeping steam temperature below the saturation point
- (d) keeping lines drained and insulated

*If choice d is selected set score to 1.*

**41.** (3.7.1.2.1-4) A water-tube boiler can be laid up either wet or dry. If it is to be laid up wet, you should \_\_\_\_\_.

- (a) drain and refill the boiler when the pH goes above 6
- (b) drain and refill the boiler each week
- (c) completely fill the boiler with deaerated feed water and maintain a slight pressure
- (d) completely fill the boiler with water, then blow down to steaming level

*If choice c is selected set score to 1.*

**42.** (3.7.1.2.2-1) Which of the methods listed would be most effective in repairing a steam cut on a seating surface of a superheater handhole plate?

- (a) Filling the cut with iron cement or plastic steel.
- (b) Filling the cut by welding and then grinding it smooth.
- (c) Refacing the surface and over torquing the handhole plate.
- (d) Grinding the seating surface and installing an oversized gasket.

*If choice b is selected set score to 1.*

**43.** (3.7.1.2.2-2) Which of the tools listed is used to remove a boiler tube from a header?

- (a) Swaging tool
- (b) Backing out tool
- (c) Laminating tool
- (d) Expanding tool

*If choice b is selected set score to 1.*

**44.** (3.7.1.2.3-1) When you are installing a new furnace floor in an oil fired boiler, the clearance between the firebricks should be large enough to \_\_\_\_\_.

- (a) allow for expansion without subjecting the joint to flame penetration
- (b) facilitate rebricking at required maintenance intervals
- (c) allow for installation of plastic chrome ore after drying
- (d) allow for proper filling with slag under normal operating conditions

*If choice a is selected set score to 1.*

**45.** (3.7.1.2.3-2) Which of the listed procedures is the most important factor to take into consideration when making repairs to the refractory surrounding the burner openings?

- (a) Design refractory cone angle must be maintained.
- (b) All cracks must be completely filled.
- (c) Plastic firebrick must be used.
- (d) Finished repair surfaces must be smooth.

*If choice a is selected set score to 1.*

**46.** (3.7.1.2.3-3) A furnace wall in which there are open spaces around the brick as a result of firebrick shrinkage, is \_\_\_\_\_.

- ☐ (a) spalled and must be replaced
- ☐ (b) normal and need only be cleaned
- ☒ (c) loose and should be repaired
- ☐ (d) cracked and must be patched

*If choice c is selected set score to 1.*

**47.** (3.7.1.2.3-4) Which of the listed refractory materials should be used for patching a burner front formed of plastic, castable, or tile?

- ☐ (a) Air-setting mortar
- ☒ (b) Plastic fireclay
- ☐ (c) Chrome castable insulation
- ☐ (d) Plastic chrome insulation

*If choice b is selected set score to 1.*

**48.** (3.7.1.2.3-5) After patching refractory with plastic firebrick, holes are poked in the patch on 1 1/2 inch centers in order to \_\_\_\_\_.

- ☐ (a) allow for expansion
- ☐ (b) prevent slag buildup
- ☐ (c) prevent spalling
- ☒ (d) vent escaping moisture

*If choice d is selected set score to 1.*

**49.** (3.7.1.2.3-6) To assure a long service life for boiler refractory materials after installation, the most effective method is to \_\_\_\_\_.

- ☐ (a) patch refractory with plastic chrome ore
- ☐ (b) properly secure refractory with anchor bolts
- ☒ (c) avoid rapid temperature changes and follow recommended operating procedures
- ☐ (d) maintain a high furnace temperature at all times

*If choice c is selected set score to 1.*

**50.** (3.7.1.2.4-1) When installed, the economizer relief valve should always be set \_\_\_\_\_.

- ☒ (a) 50 pounds higher than the drum safety valve plus the water pressure drop through the economizer
- ☐ (b) 50 pounds higher than the superheater safety valve plus the water pressure drop through the economizer
- ☐ (c) at the same pressure as the superheater safety valve
- ☐ (d) at the same pressure as the drum safety valve

*If choice a is selected set score to 1.*

**51.** (3.7.1.2.5-1) When water washing a boiler, the proper sequence for washing the sections should be the \_\_\_\_\_.

- ☐ (a) generating tubes, superheater, and then economizer
- ☐ (b) screen tubes, generating tubes, and then superheater
- ☐ (c) superheater, economizer, and then generating tubes
- ☒ (d) economizer, superheater, generating, and then screen tubes

*If choice d is selected set score to 1.*

**52.** (3.7.1.2.5-2) Which of the listed mediums should be used when water washing a boiler?

- ☐ (a) Cold freshwater
- ☐ (b) Cold saltwater
- ☐ (c) Heated saltwater
- ☒ (d) Heated freshwater

*If choice d is selected set score to 1.*

**53.** (3.7.1.3.1-1) According to the data given in the illustration, which of the following would be the physical state of the fluid at a gage vacuum of 25.03 inches Hg, and 126.08 degrees Fahrenheit?  
Illustration SG-0026

- ☐ (a) Superheated vapor.
- ☒ (b) Sub cooled liquid.
- ☐ (c) Mixture of saturated liquid and vapor.
- ☐ (d) Saturated liquid.

*If choice b is selected set score to 1.*

**54.** (3.7.1.3.1-2) If the saturation pressure of water is increased, the relative values shown on the illustrated graph of SG-0001 will change. According to pertinent information found in the steam tables of SG-0004, this will result in \_\_\_\_\_. Illustration SG-0001 and SG-0004

- ☐ (a) no change to the length of line 4
- ☒ (b) a decrease the length of line 4
- ☐ (c) no change in the height of line 4
- ☐ (d) a decrease in the height of line 4

*If choice b is selected set score to 1.*



**55.** (3.7.1.3.1-3) Which of the following statements is true concerning the information tabulated in the table? Illustration SG-0004

- ☐ (a) At 185.3 psig (1366.4 kPa), the saturation temperature of a mixture of water and steam is 377.51°F (192°C).
- ☒ (b) When one pound of water changes to one pound of steam at 200 psia (1378.8 kPa), its volume increases 124.41 times.
- ☐ (c) If one pound of steam at 250 psia (1723.5 kPa) condenses to one pound of water it will give up 843 BTU's (889.4 kJ) while changing state.
- ☐ (d) All of the above.

*If choice b is selected set score to 1.*

**56.** (3.7.1.3.1-4) According to the data given in illustration, which of the following would be the physical state of the fluid at a gage vacuum of 28.09 inches Hg, and 117.99 degrees Fahrenheit? Illustration SG-0026

- ☐ (a) Mixture of saturated liquid and vapor.
- ☐ (b) Sub cooled liquid.
- ☐ (c) Saturated liquid.
- ☒ (d) Superheated vapor.

*If choice d is selected set score to 1.*

**57.** (3.7.1.3.1-5) If a boiler generates saturated steam at 125.3 psig, how much heat is required to change the water into steam if the feed water temperature is 240°F? SG-0004

- ☒ (a) 983.4 Btu/lb
- ☐ (b) 582.7 Btu/lb
- ☐ (c) 30.5 Btu/lb
- ☐ (d) 116.5 Btu/lb

*If choice a is selected set score to 1.*

**58.** (3.7.1.3.1-6) What physical changes will occur to the steam within a boiler that has been properly bottled up when additional heat is applied?

- ☐ (a) The pressure will increase and the volume will remain constant.
- ☐ (b) The steam pressure and its specific volume will remain constant.
- ☒ (c) The pressure will increase and the specific volume will decrease.
- ☐ (d) The pressure will remain constant and the specific volume will increase.

*If choice c is selected set score to 1.*

**59.** (3.7.1.3.2-1) The major heat loss in an oil fired boiler is the heat \_\_\_\_\_.

- ☐ (a) required to change water into steam
- ☐ (b) passing through the boiler casing
- ☒ (c) going up the stack
- ☐ (d) used in the economizer and air heater

*If choice c is selected set score to 1.*

**60.** (3.7.1.3.2-2) A lower than normal boiler stack gas temperature usually indicates \_\_\_\_\_.

- ☒ (a) incomplete combustion
- ☐ (b) dirty watersides
- ☐ (c) dirty firesides
- ☐ (d) fuel high sulfur content

*If choice a is selected set score to 1.*

**61.** (3.7.1.3.2-3) A high carbon monoxide content in the flue gases of a boiler indicates \_\_\_\_\_.

- ☐ (a) complete combustion
- ☐ (b) a high carbon content fuel
- ☐ (c) too much excess air
- ☒ (d) incomplete combustion

*If choice d is selected set score to 1.*

**62.** (3.7.1.3.3-1) When the rate of heat transfer through tube walls is so reduced that the metal becomes overheated, which of the following conditions will result in the boiler?

- ☒ (a) Fireside burning
- ☐ (b) Fireside thinning
- ☐ (c) Steam gouging
- ☐ (d) Steam binding

*If choice a is selected set score to 1.*

**63.** (3.7.1.3.3-2) Cratering and water tracking in boiler tubes is caused by \_\_\_\_\_.

- ☒ (a) water trapped between tubes and refractory
- ☐ (b) burning a fuel with a high vanadium content
- ☐ (c) soot corrosion
- ☐ (d) baked on slag deposits

*If choice a is selected set score to 1.*

**64.** (3.7.1.3.3-3) The formation of a pit in the surface of a boiler tube is most likely to occur when \_\_\_\_\_.

- ☐ (a) dissolved minerals are present
- ☐ (b) waterside deposits are present
- ☐ (c) sludge is present
- ☒ (d) the tube metal acts as an anode

*If choice d is selected set score to 1.*

**65.** (3.7.1.3.3-4) In a water-tube boiler, waterside scale formation is caused by \_\_\_\_\_.

- ☐ (a) sodium hydroxide
- ☐ (b) sodium phosphate
- ☒ (c) calcium sulfate
- ☐ (d) magnesium phosphate

*If choice c is selected set score to 1.*

**66.** (3.7.1.3.3-5) Blisters developing on boiler tubes can be caused by \_\_\_\_\_.

- ☐ (a) hot feed water
- ☒ (b) waterside scale deposits
- ☐ (c) cold feed water
- ☐ (d) air in the feed water

*If choice b is selected set score to 1.*

**67.** (3.7.1.3.3-6) Waterside abrasion of boiler tubes can be caused by \_\_\_\_\_.

- ☒ (a) mechanical tube cleaning
- ☐ (b) oxygen corrosion
- ☐ (c) improper bends in the tubes
- ☐ (d) entrained impurities in the boiler water

*If choice a is selected set score to 1.*

**68.** (3.7.1.3.3-7) Fireside burning of boiler tubes is usually the direct result of \_\_\_\_\_.

- ☐ (a) gas laning in tube banks
- ☐ (b) oxygen corrosion of metallic surfaces
- ☒ (c) overheating due to poor heat transfer
- ☐ (d) high furnace temperatures

*If choice c is selected set score to 1.*

**69.** (3.7.1.3.3-8) Boiler tube failures can result from \_\_\_\_\_.

- ☐ (a) corrosion
- ☐ (b) overheating
- ☐ (c) mechanical stress
- ☒ (d) all of the above

*If choice d is selected set score to 1.*

**70.** (3.7.1.3.4-1) Warping of superheater screen tubes can be caused by \_\_\_\_\_.

- ☐ (a) high superheater temperatures
- ☒ (b) sudden cooling of tubes after being overheated
- ☐ (c) high furnace temperatures
- ☐ (d) installing baffles of excessive length

*If choice b is selected set score to 1.*

**71.** (3.7.1.3.4-2) An excessively high superheater temperature could be the result of \_\_\_\_\_.

- ☐ (a) soot accumulation on the superheater
- ☐ (b) high feed water temperature
- ☒ (c) excessive air
- ☐ (d) excessive steam demand

*If choice c is selected set score to 1.*

**72.** (3.7.1.3.4-3) When operating under constant load, the superheated steam temperature may rise above normal if the \_\_\_\_\_.

- ☐ (a) excess air is too low
- ☐ (b) feed water temperature is too high
- ☐ (c) boiler is priming
- ☒ (d) feed water temperature is too low

*If choice d is selected set score to 1.*

**73.** (3.7.1.3.4-4) Under normal operating conditions, a drop in the steam temperature leaving an uncontrolled interdeck superheater could be caused by a \_\_\_\_\_.

- ☒ (a) decrease in combustion gas velocity through the superheater
- ☐ (b) badly fouled economizer
- ☐ (c) decrease in steam velocity through the superheater
- ☐ (d) drop in the feed water temperature

*If choice a is selected set score to 1.*

**74.** (3.7.1.3.4-5) Insufficient combustion air supply to the furnace would cause \_\_\_\_\_.

- ☐ (a) high feed water consumption
- ☐ (b) high stack temperature
- ☒ (c) low superheater outlet temperature
- ☐ (d) the fires to sputter

*If choice c is selected set score to 1.*

**75.** (3.7.1.3.4-6) Dirty generating tube surfaces may cause higher than normal superheater outlet temperatures because \_\_\_\_\_.

- ☒ (a) the boiler must be over fired to maintain the required rate of steam generation
- ☐ (b) the screen tubes absorb excessive heat and transfer the increased temperature to the superheater
- ☐ (c) the temperature of the gas leaving the generating banks will be lower than normal
- ☐ (d) gas laning will result causing overheating of the superheater

*If choice a is selected set score to 1.*

**76.** (3.7.1.3.5-1) Which of the following would indicate a moderate leak in the desuperheater?

- ☐ (a) Higher than normal auxiliary steam pressure
- ☒ (b) Lower than normal auxiliary steam temperature
- ☐ (c) Higher than normal fuel oil consumption
- ☐ (d) Lower than normal fuel oil consumption

*If choice b is selected set score to 1.*

**77.** (3.7.1.3.6-1) Which of the conditions listed could cause a boiler economizer to leak?

- ☐ (a) High stack gas temperatures.
- ☐ (b) High feed water temperatures.
- ☒ (c) Water hammer.
- ☐ (d) Low feed water pressure.

*If choice c is selected set score to 1.*

**78.** (3.7.1.3.6-2) Which of the conditions listed would indicate excessive soot buildup on the economizer?

- ☐ (a) High feed water temperature entering the boiler
- ☒ (b) High superheater temperature
- ☐ (c) Lower than usual air pressure in the furnace
- ☐ (d) Low air temperature entering the boiler

*If choice b is selected set score to 1.*

**79.** (3.7.1.3.7-1) Slag buildup on boiler furnace refractory is undesirable because it causes \_\_\_\_\_.

- ☐ (a) shrinking of the brickwork
- ☐ (b) excessive cooling of the brickwork
- ☒ (c) peeling or spalling of the brickwork
- ☐ (d) fracturing of the anchor bolts

*If choice c is selected set score to 1.*

**80.** (3.7.1.3.7-2) Which of the following conditions is indicated by an external bulge or bowed area of the boiler furnace wall?

- ☒ (a) The furnace brickwork has collapsed in that area.
- ☐ (b) The insulation block has become slagged.
- ☐ (c) The corbels have failed.
- ☐ (d) The brickwork has become slagged.

*If choice a is selected set score to 1.*

**81.** (3.7.1.3.7-3) Which of the following problems can occur when an excessive number of water screen tubes are plugged?

- ☐ (a) Steam temperature in the drum will decrease.
- ☐ (b) Superheater outlet pressure will rise.
- ☐ (c) Steam pressure leaving the drum will increase.
- ☒ (d) Superheater outlet temperature will rise.

*If choice d is selected set score to 1.*

**82.** (3.7.1.3.7-4) Which of the conditions listed occurs when glassy slag, formed by the burning of fuel oil contaminated with salt water, melts and runs over the furnace wall?

- ☐ (a) Formation of a protective coating.
- ☐ (b) Cracks through the furnace floor.
- ☐ (c) Increased furnace temperature.
- ☒ (d) Damage to the furnace refractory.

*If choice d is selected set score to 1.*

**83.** (3.7.1.3.8-1) Excessive foaming in a steaming boiler can cause damage to the \_\_\_\_\_.

- ☒ (a) superheater
- ☐ (b) internal feed pipe
- ☐ (c) desuperheater
- ☐ (d) economizer

*If choice a is selected set score to 1.*

**84.** (3.7.1.3.8-2) In a boiler equipped with an automatic feed water regulator, erratic variations in the water level could be caused by \_\_\_\_\_.

- (a) high solids content and foaming in the drum
- (b) ruptured feed water control valve diaphragm
- (c) high feed water temperature
- (d) low feed water temperature

*If choice a is selected set score to 1.*

**85.** (3.7.1.3.8-3) Rapid fluctuation in the superheater temperature of a steady steaming boiler indicates \_\_\_\_\_.

- (a) improper positioning of superheater fires
- (b) leaky superheater tubes
- (c) moisture carryover
- (d) leaky desuperheater tubes

*If choice c is selected set score to 1.*

**86.** (3.7.1.3.8-4) Oil accumulation in boiler water would \_\_\_\_\_.

- (a) cause foaming and carryover from the boiler
- (b) prevent acid attack on the boiler tubes
- (c) practically eliminate boiler sludge formation
- (d) increase the heat transfer rate

*If choice a is selected set score to 1.*

**87.** (3.7.1.3.8-5) High boiler water level can cause carryover and \_\_\_\_\_.

- (a) warped screen tubes
- (b) warped water wall tubes
- (c) damage to the superheater tubes
- (d) damage to the economizer

*If choice c is selected set score to 1.*

**88.** (3.7.2.1.1-1) Large steam drums are not required in the design of a coil-type auxiliary water-tube boiler because \_\_\_\_\_.

- (a) steam and water are separated in the accumulator (flash chamber)
- (b) the heat of combustion is sufficient to remove all moisture from the steam
- (c) the volume of steam is small at low pressures
- (d) automatic burner cycling controls steam volume and quality

*If choice a is selected set score to 1.*

**89.** (3.7.2.1.1-3) The gage glass on a coil-type auxiliary boiler is connected to the \_\_\_\_\_.

- ☐ (a) heating coil inlet and outlet
- ☐ (b) surge chamber
- ☒ (c) accumulator
- ☐ (d) water softener

*If choice c is selected set score to 1.*

**90.** (3.7.2.1.1-5) Bottom blow valves are installed on auxiliary water-tube boilers to \_\_\_\_\_.

- ☐ (a) completely drain the boiler in an emergency
- ☐ (b) prevent sludge from forming in the steam drum
- ☐ (c) remove floating impurities from the boiler water surface
- ☒ (d) remove settled solids from the water drum

*If choice d is selected set score to 1.*

**91.** (3.7.2.1.1-7) The rate of heat transfer in a water-tube auxiliary boiler can be increased by \_\_\_\_\_.

- ☐ (a) operating the boiler at less than normal water level
- ☒ (b) installing fins on the firesides of water-tubes
- ☐ (c) increasing the amount of excess air to the burners
- ☐ (d) treating the boiler water with chemical oxygen scavengers

*If choice b is selected set score to 1.*

**92.** (3.7.2.1.1-9) The purpose of try-cocks used on an auxiliary boiler is to \_\_\_\_\_.

- ☒ (a) provide an alternate means of determining the water level, if the gage glass fails
- ☐ (b) provide a means of adding chemical feed to the boiler water
- ☐ (c) provide a means for blowing down the gage glass
- ☐ (d) act as a steam sentinel valve, if any of the fusible plugs should melt

*If choice a is selected set score to 1.*

**93.** (3.7.2.1.2-1) The rate of heat transfer in a water-tube auxiliary boiler can be increased by \_\_\_\_\_.

- ☐ (a) operating the boiler at less than normal water level
- ☒ (b) installing fins on the firesides of water-tubes
- ☐ (c) increasing the amount of excess air to the burners
- ☐ (d) treating the boiler water with chemical oxygen scavengers

*If choice b is selected set score to 1.*



94. (3.7.2.1.2-2) The tube sheets installed in a fire-tube auxiliary boiler are normally connected by \_\_\_\_\_.

- ☐ (a) girder stays
- ☒ (b) fire-tubes and stay-tubes
- ☐ (c) external boiler plating
- ☐ (d) separate crown sheets

*If choice b is selected set score to 1.*

95. (3.7.2.1.2-3) Which of the following statements concerning fire-tube boilers is correct?

- ☒ (a) Combustion gases flow through the tubes.
- ☐ (b) Flames impinge on the tubes.
- ☐ (c) Combustion occurs in the tubes.
- ☐ (d) Water flows through the tubes.

*If choice a is selected set score to 1.*

96. (3.7.2.1.2-4) The boiler shown in the illustration would be classed as \_\_\_\_\_. MO-0064

- ☐ (a) two-pass, water-tube
- ☐ (b) two-pass, scotch marine
- ☒ (c) single-pass, fire-tube, scotch marine
- ☐ (d) forced circulation, coil-type

*If choice c is selected set score to 1.*

97. (3.7.2.1.2-5) Which of the listed problems will happen when the water level of a fire-tube type auxiliary boiler approaches the crown sheet?

- ☒ (a) The fusible plugs will melt.
- ☐ (b) The furnace will explode.
- ☐ (c) Excess steam will be generated.
- ☐ (d) The furnace will overheat.

*If choice a is selected set score to 1.*

98. (3.7.2.1.2-6) Fusible plugs are installed in fire-tube boilers to \_\_\_\_\_.

- ☐ (a) provide a means of draining the boiler
- ☒ (b) warn the engineer of low water level
- ☐ (c) cool the crown sheet at high firing rates
- ☐ (d) open the burners' electrical firing circuits

*If choice b is selected set score to 1.*

**99.** (3.7.2.1.3-1) Constant capacity, pressure atomizing, fuel burners designed to meet a wide variation in steaming loads on an auxiliary boiler, are \_\_\_\_\_.

- ☐ (a) automatically supplied with warmer air on demand
- ☐ (b) automatically supplied with more fuel on demand
- ☐ (c) equipped with standard variable capacity atomizers
- ☒ (d) cycled on and off in response to steam demand

*If choice d is selected set score to 1.*

**100.** (3.7.2.1.3-2) The primary function of a flame safeguard system, as used on an automatically fired auxiliary boiler, is to prevent \_\_\_\_\_.

- ☐ (a) accidental dry firing and overpressure
- ☐ (b) uncontrolled fires in the furnace
- ☒ (c) explosions in the boiler furnace
- ☐ (d) overheating of the pressure parts

*If choice c is selected set score to 1.*

**101.** (3.7.2.1.3-3) A photoelectric cell installed in an automatically fired auxiliary boiler burner management system \_\_\_\_\_.

- ☒ (a) opens the burner circuit upon sensing a flame failure
- ☐ (b) detects a flame failure by monitoring radiant heat from glowing refractory
- ☐ (c) requires mechanical linkage to secure the burner fuel supply
- ☐ (d) must be bypassed at low firing rates

*If choice a is selected set score to 1.*

**102.** (3.7.2.1.3-4) During unsafe firing conditions in a large automatic auxiliary boiler, various control actuators are interlocked with the burner circuit to prevent start-up, in addition to safety shutdown. These controls are referred to as \_\_\_\_\_.

- ☒ (a) limit controls
- ☐ (b) flame safeguard controls
- ☐ (c) combustion controls
- ☐ (d) programming controls

*If choice a is selected set score to 1.*

**103.** (3.7.2.1.3-5) Which of the listed sequence of events occurs when an automatic auxiliary boiler is prepurged?

- (a) The damper on the inlet side of the furnace is moved to the open position for a given number of seconds and then moved to the closed position.
- (b) The damper on the inlet side of the furnace is moved to the open position for a given number of seconds and then moved to the low fire position.
- (c) The damper is moved to the closed position for a given number of seconds and then moved to the low fire position.
- (d) The damper in the uptakes is moved to the wide open position for a given number of seconds and then moved to the low firing rate position.

*If choice b is selected set score to 1.*

**104.** (3.7.2.1.3-6) The pressuretrol which is installed on an auxiliary boiler senses steam pressure changes and \_\_\_\_\_.

- (a) controls the flow of feed water to the boiler
- (b) monitors the boiler high water level
- (c) secures the fires when a fusible plug burns out
- (d) automatically regulates the quantity of oil and air flow to the burner

*If choice d is selected set score to 1.*

**105.** (3.7.2.1.3-7) Which of the following actions takes place in the control circuit of an automatically fired auxiliary boiler when the desired steam pressure is obtained?

- (a) A temperature sensing device opens the circuit breaker in the burner motor.
- (b) The high limit control secures power to the entire oil firing system.
- (c) The stack relay actuates the low limit control which breaks the ignition circuit.
- (d) The stack relay secures power to the high voltage side of the ignition transformer.

*If choice b is selected set score to 1.*

**106.** (3.7.2.1.4-1) Which of the following statements describes how the fuel oil enters the whirling chambers of the sprayer plates used in a auxiliary boiler return flow fuel oil system?

- (a) Through the outer barrel tube.
- (b) Through the sprayer plate drilled passages.
- (c) Through tangential slots in the sprayer plate.
- (d) Through baffles in the orifice plate.

*If choice c is selected set score to 1.*

**107.** (3.7.2.1.4-2) The solenoid valves in the fuel oil supply line to an automatically fired auxiliary boiler, are automatically closed by \_\_\_\_\_.

- ☐ (a) a decrease in feed temperature
- ☐ (b) high furnace air pressure
- ☒ (c) high steam pressure
- ☐ (d) low steam pressure

*If choice c is selected set score to 1.*

**108.** (3.7.2.1.4-3) A variable capacity, pressure atomizing, fuel oil burner functions to \_\_\_\_\_.

- ☐ (a) maintain a constant fuel temperature
- ☒ (b) provide a wide range of combustion
- ☐ (c) provide a constant fuel return pressure
- ☐ (d) maintain smokeless fuel oil atomization

*If choice b is selected set score to 1.*

**109.** (3.7.2.1.4-4) When the steam pressure drops below a set value on an automatically fired auxiliary boiler, fitted with rotary cup atomizers, the combustion control system will \_\_\_\_\_.

- ☒ (a) increase the fuel oil control valve opening
- ☐ (b) increase the rotary cup speed
- ☐ (c) decrease the back pressure regulating valve opening
- ☐ (d) decrease the supply steam control valve opening

*If choice a is selected set score to 1.*

**110.** (3.7.2.1.4-5) Control of the fuel oil metering valve in an automatically fired auxiliary boiler is accomplished by a \_\_\_\_\_.

- ☐ (a) pressure magnifying device in the steam coil outlet
- ☒ (b) steam pressure sensing device with linkage to the damper air vanes
- ☐ (c) metering device in the air supply line
- ☐ (d) signal from the feed water electrode

*If choice b is selected set score to 1.*

**111.** (3.7.3.1.1-1) Which piping system is described in the illustration provided. Illustration SG-0010

- ☐ (a) Auxiliary desuperheated steam system
- ☒ (b) Boiler feed and condensate system
- ☐ (c) Main superheated steam system
- ☐ (d) Turbine bleed steam system

*If choice b is selected set score to 1.*

**112.** (3.7.3.1.1-2) If manual control of the water level in a steaming boiler is required, the proper method of control is with the auxiliary feed \_\_\_\_\_.

- ☐ (a) pump pressure control
- ☐ (b) pump speed control
- ☐ (c) stop valve
- ☒ (d) stop-check valve

*If choice d is selected set score to 1.*

**113.** (3.7.3.1.1-3) The boiler main feed stop check valve is located nearest the \_\_\_\_\_.

- ☐ (a) DC heater feed water outlet
- ☐ (b) boiler water drum inlet
- ☐ (c) first stage feed water heater outlet
- ☒ (d) main feed water regulator inlet

*If choice d is selected set score to 1.*

**114.** (3.7.3.1.1-4) When operating with the auxiliary feed line, feed water flow is controlled \_\_\_\_\_.

- ☒ (a) manually by throttling the auxiliary feed stop-check valve
- ☐ (b) automatically by the main feed water regulator
- ☐ (c) manually by adjustment of the auxiliary feed water regulator spring setting
- ☐ (d) automatically by the economizer bypass

*If choice a is selected set score to 1.*

**115.** (3.7.3.1.1-5) A boiler feed stop-valve must be mounted \_\_\_\_\_.

- ☐ (a) at or near the engine room operating platform
- ☒ (b) between the feed check valve and the boiler drum
- ☐ (c) upstream of the feed water regulator
- ☐ (d) between the feed pump and the feed check valve

*If choice b is selected set score to 1.*

**116.** (3.7.3.1.2-1) The pressure in the feed water system must exceed boiler steam drum pressure in order to \_\_\_\_\_.

- ☐ (a) prevent air leakage into the feed water system
- ☐ (b) prevent water hammer in the lines
- ☒ (c) force the feed water into the boiler
- ☐ (d) remove the steam from the steam drum

*If choice c is selected set score to 1.*

**117.** (3.7.3.1.2-2) Which of the following statements is correct regarding the start-up operation of a non-condensing turbine-driven feed pump?

- ☐ (a) Secure all drains prior to admitting any steam to avoid damage to traps.
- ☐ (b) Keep the steam exhaust valve closed until steam is applied to ensure that the auxiliary exhaust line pressure does not drop.
- ☐ (c) Keep the pump casing vent valve closed until flow is established through the pump.
- ☒ (d) Open the pump suction valve prior to admitting steam to the turbine.

*If choice d is selected set score to 1.*

**118.** (3.7.3.1.2-3) Recirculation of the feed water ensures a flow of water through the \_\_\_\_\_.

- ☐ (a) standby feed pump suction line
- ☐ (b) third stage heater
- ☒ (c) main feed pump
- ☐ (d) economizer

*If choice c is selected set score to 1.*

**119.** (3.7.3.1.2-4) During initial starting of the standby turbine-driven boiler feed pump, which of the listed valves should remain closed?

- ☐ (a) Turbine exhaust valve
- ☒ (b) Pump discharge check valve
- ☐ (c) Turbine steam supply valve
- ☐ (d) Pump suction valve

*If choice b is selected set score to 1.*

**120.** (3.7.3.1.2-5) A turbine-driven centrifugal feed pump used for boiler feed service should normally be stopped by \_\_\_\_\_.

- ☐ (a) opening wide the recirculating valve and then manually closing the throttle
- ☐ (b) slowly closing the manual throttle
- ☐ (c) closing off the steam via the excess pressure pump governor
- ☒ (d) hand activating the over speed trip

*If choice d is selected set score to 1.*

**121.** (3.7.3.1.3-1) Why is it necessary to have a relief valve protect the deaerating feed tank from internal pressure?

- ☒ (a) Because the tank receives high pressure drains.
- ☐ (b) Because the tank drains to the main condenser.
- ☐ (c) Because the tank receives large amounts of water.
- ☐ (d) Because the tank receives auxiliary exhaust.

*If choice a is selected set score to 1.*

**122.** (3.7.3.1.3-3) High pressure steam drains are normally discharged to the \_\_\_\_\_.

- (a) reserve feed tank
- (b) DC heater
- (c) atmospheric drain line
- (d) drain and inspection tank

*If choice b is selected set score to 1.*

**123.** (3.7.3.1.3-2) To provide emergency feed water supply to a steaming boiler, if it becomes necessary to secure the DC heater, suction should be taken on the distilled water tank using the \_\_\_\_\_.

- (a) feed booster pump
- (b) emergency feed pump
- (c) emergency injector discharge
- (d) main condensate pump

*If choice b is selected set score to 1.*

**124.** (3.7.3.1.3-4) The purpose of the steam control valves installed in the auxiliary exhaust line is to \_\_\_\_\_.

- (a) regulate back pressure in the desuperheater line
- (b) seal the vent condenser to prevent the escape of condensate
- (c) control steam admission and maintain the proper steam spray pattern in the DC heater
- (d) preheat the condensate before it enters the vent condenser

*If choice c is selected set score to 1.*

**125.** (3.7.3.1.3-5) The gland exhaust fan draws steam and non-condensable vapors from the gland exhaust condenser and discharges to the \_\_\_\_\_.

- (a) atmosphere
- (b) main condenser
- (c) vent condenser
- (d) atmospheric drain tank

*If choice a is selected set score to 1.*

**126.** (3.7.3.1.3-6) Deaeration of condensate primarily occurs in what section of the illustration shown. Illustration SG-0010

- (a) distilled water tank
- (b) main condenser hot well
- (c) DFT
- (d) first stage feed heater

*If choice c is selected set score to 1.*

**127.** (3.7.3.1.4-1) Proper lagging of a single-element feed water regulator is accomplished by applying the insulation material \_\_\_\_\_.

- ☐ (a) only as necessary to prevent possible injury
- ☒ (b) to the steam connection, but not water connection
- ☐ (c) to both connections, including finned areas
- ☐ (d) to the water connection, but not steam connection

*If choice b is selected set score to 1.*

**128.** (3.7.3.1.4-2) A two-element boiler feed water regulator is controlled by \_\_\_\_\_.

- ☒ (a) steam flow and drum water level
- ☐ (b) drum water level and drum pressure
- ☐ (c) drum water level and feed water flow
- ☐ (d) steam flow and feed water flow

*If choice a is selected set score to 1.*

**129.** (3.7.3.1.4-3) A pneumatic dual element, main propulsion, boiler feed water regulating system commonly used aboard ship utilizes \_\_\_\_\_.

- ☐ (a) two-position differential action
- ☐ (b) on off reset action
- ☐ (c) proportional action
- ☒ (d) proportional plus reset action

*If choice d is selected set score to 1.*

**130.** (3.7.3.1.4-4) A single element boiler feed water regulating system used aboard ship utilizes \_\_\_\_\_.

- ☐ (a) two position differential gap action
- ☐ (b) proportional plus reset action
- ☒ (c) proportional action
- ☐ (d) proportional plus reset plus rate action

*If choice c is selected set score to 1.*

**131.** (3.7.3.3-1) Excess free oxygen in the boiler feed water can be the result of \_\_\_\_\_.

- ☐ (a) improper operation of the gland exhaustor
- ☒ (b) improper operation of the DC heater
- ☐ (c) steam leaks through the turbine glands
- ☐ (d) vapor lock in the boiler feed pump

*If choice b is selected set score to 1.*



**132.** (3.7.3.3-2) If the DC heater relief valve lifts frequently, the cause can be excessive \_\_\_\_\_.

- (a) auxiliary exhaust steam pressure
- (b) makeup feed introduced to the system
- (c) feed water recirculated from the feed pump
- (d) condensate supplied to the DC heater

*If choice a is selected set score to 1.*

**133.** (3.7.3.3-3) Which of the conditions listed may be indicated by the lifting of the DC heater relief valve?

- (a) Low water level continually maintained in the DC heater.
- (b) Excessive deaeration of the feed water.
- (c) Low back pressure in the auxiliary exhaust line.
- (d) A malfunctioning auxiliary exhaust make-up steam regulating valve.

*If choice d is selected set score to 1.*

**134.** (3.7.3.3-4) Excessive water loss from the main feed system can be caused by \_\_\_\_\_.

- (a) an atmospheric drain tank trap frozen in the closed position
- (b) a leak in the desuperheater internal gasket
- (c) a vapor bound main condensate pump
- (d) excessive recirculation of condensate from the outlet of the air ejector condenser to the main condenser

*If choice a is selected set score to 1.*

**135.** (3.7.3.3-5) In a closed feed and water cycle, which of the conditions listed could prevent vacuum from reaching the desired level?

- (a) Steam pressure to air ejectors maintained at 10 psig above designed supply pressure.
- (b) Marine growth on the cooling water side of the main condenser.
- (c) Condensate recirculating back to the condenser during maneuvering.
- (d) Steam leaking from the turbine glands.

*If choice b is selected set score to 1.*

**136.** (3.7.3.3-6) The water level in a steaming boiler has risen to within 2 inches of the top of the top gage glass. Your immediate action should be to \_\_\_\_\_.

- (a) secure the fires and open the bottom blow valve
- (b) open the surface blow line
- (c) reduce the feed water flow to the boiler
- (d) secure the feed water flow to the boiler

*If choice c is selected set score to 1.*

**137.** (3.7.3.3-7) On a steam vessel, if a centrifugal main feed pump were operating at shutoff head with the recirculating line closed, which of the following conditions could occur?

- (a) Excessive diaphragm seal wear in the feed water regulator.
- (b) Water level in the DC heater would decrease.
- (c) Flashing at the suction side of the pump.
- (d) An increased water level in the steam drum.

*If choice c is selected set score to 1.*

**138.** (3.7.4.1.1-1) Air accumulated in the inter condenser of the air ejector assembly is discharged directly to the \_\_\_\_\_.

- (a) main condenser
- (b) after condenser
- (c) atmosphere
- (d) high pressure turbine

*If choice b is selected set score to 1.*

**139.** (3.7.4.1.1-2) Which statement is true concerning two-stage air ejector assemblies?

- (a) Steam to the after condenser is condensed and returned to the main condenser via the loop seal.
- (b) Air is removed from the condensate as it passes through the tubes.
- (c) The first stage air ejector takes suction on the second stage to increase vacuum.
- (d) The steam/air mixture from the main condenser is discharged by the first stage air ejector to the inter condenser.

*If choice d is selected set score to 1.*

**140.** (3.7.4.1.1-3) Serious tube leaks in the air ejector condenser assembly will cause \_\_\_\_\_.

- (a) fouled nozzles
- (b) clogged steam strainers
- (c) faulty steam pressure
- (d) loss of vacuum

*If choice d is selected set score to 1.*

**141.** (3.7.4.1.1-4) Why does air entry into the main condenser reduce the efficiency of the steam cycle?

- (a) The air mixes with the steam and enters the condensate
- (b) Condensate sub cooling in the main condenser increases
- (c) Steam flow rate through the main turbine increases
- (d) Low pressure turbine exhaust steam enthalpy value increases

*If choice d is selected set score to 1.*

**142.** (3.7.4.1.1-5) Which of the devices listed is used to keep overheated condensate from flowing to the deaerating feed tank?

- ☐ (a) Recirculating line to the main feed pump
- ☐ (b) Freshwater cooler
- ☒ (c) Recirculating line to the main condenser
- ☐ (d) Saltwater cooler

*If choice c is selected set score to 1.*

**143.** (3.7.4.1.2-1) Which statement listed represents a vital function of the main condenser?

- ☐ (a) Storage of feed water for immediate use in the boilers.
- ☐ (b) Cooling of the exhaust steam from the auxiliary exhaust system before it enters the deaerating feed tank.
- ☐ (c) Condensing of the exhaust steam from the main feed turbine pumps.
- ☒ (d) The recovery of feed water for reuse.

*If choice d is selected set score to 1.*

**144.** (3.7.4.1.2-2) The leakage of air into the pump casing by way of the packing gland of a condensate pump, is prevented by \_\_\_\_\_.

- ☒ (a) a water seal line to the packing gland
- ☐ (b) an air seal line from the compressed air line
- ☐ (c) special packing in the stuffing box
- ☐ (d) the vacuum in the pump suction

*If choice a is selected set score to 1.*

**145.** (3.7.4.1.2-3) If the main condenser were operating at a vacuum of 28.5"Hg, a condensate discharge temperature of 86°F, a seawater inlet temperature of 72°F, and a seawater outlet temperature of 79°F, what would be the condensate depression? Illustration SG-0026

- ☐ (a) 0.2 inches Hg
- ☒ (b) 4 degrees Fahrenheit
- ☐ (c) 7 degrees Fahrenheit
- ☐ (d) 0.7 inches Hg

*If choice b is selected set score to 1.*

**146.** (3.7.4.1.2-4) Air accumulated in the after condenser of the air ejector unit is discharged directly to the \_\_\_\_\_.

- ☒ (a) atmosphere
- ☐ (b) inter condenser
- ☐ (c) high pressure turbine
- ☐ (d) main condenser

*If choice a is selected set score to 1.*

**147.** (3.7.4.1.2-5) One of the basic rules applying to the operation of a single-pass main condenser is that the \_\_\_\_\_.

- (a) cooling water overboard should be about 10°F higher than the inlet temperature
- (b) vacuum must be maintained at 29.92" of Hg. under all operating conditions
- (c) quantity of reheating steam flow through the condenser must be maintained at maximum under all operating conditions
- (d) condensate temperature must never be allowed to drop below 104°F

*If choice a is selected set score to 1.*

**148.** (3.7.4.1.2-6) Maintaining low pressure in a condensing turbine exhaust trunk \_\_\_\_\_.

- (a) enables better utilization of available heat energy to perform work
- (b) eliminates creep problems in the exhaust trunk during maneuvering
- (c) reduces condensate depression with low seawater temperature
- (d) prevents steam turbulence in the exhaust trunk due to steam laming

*If choice a is selected set score to 1.*

**149.** (3.7.4.1.3-1) The connections labeled "A" in the illustration, are used to \_\_\_\_\_. SG-0025

- (a) provide a point of admission for the L.P. bleed steam
- (b) drain condensate from the feed water heater to the main condenser
- (c) maintain a vacuum in the shell of the feed water heater
- (d) provide a point of admission for the steam air heater drains

*If choice c is selected set score to 1.*

**150.** (3.7.4.1.3-2) The unit shown in the illustration is used as the \_\_\_\_\_. SG-0025

- (a) Butterworth feed heater
- (b) combined low pressure feed heater
- (c) flash evaporator salt water feed heater
- (d) high pressure feed heater

*If choice b is selected set score to 1.*

**151.** (3.7.4.1.3-3) A slight vacuum is maintained in the shell of the first stage heater shown in the illustration. The primary reason for the vacuum is to \_\_\_\_\_. SG-0025

- (a) force the use of the main condenser as the drain cooler
- (b) provide a low pressure area to guarantee feed water flow to the heater
- (c) maintain a positive flow of steam as supplied by the main engine LP bleed system
- (d) avoid the necessity of having to use the condensate pumps

*If choice c is selected set score to 1.*

**152.** (3.7.4.1.3-4) The steam separator as used in conjunction with a steam whistle normally drains to which of the listed drain systems?

- ☐ (a) Low pressure
- ☒ (b) High pressure
- ☐ (c) Contaminated
- ☐ (d) Main turbine

*If choice b is selected set score to 1.*

**153.** (3.7.4.1.3-5) Which of the following statements represents the function of a turbine gland exhaust condenser?

- ☐ (a) Recovers condensate from the gland leakage around the ahead and astern throttle valves.
- ☐ (b) Recovers condensate formed at the gland seal exhaust leak off.
- ☐ (c) Directs the gland exhaust from the turbine sealing glands to the air ejector suction.
- ☒ (d) Assists in preheating the condensate before it enters the DC heater.

*If choice d is selected set score to 1.*

**154.** (3.7.4.1.4-1) What type of sensor is normally used with the automatic recirculating valve in the main condensate line?

- ☒ (a) Thermostatic
- ☐ (b) Continuity
- ☐ (c) Preset electric timing sensor
- ☐ (d) Pressure

*If choice a is selected set score to 1.*

**155.** (3.7.4.1.4-2) High pressure and low pressure drain systems are part of the \_\_\_\_\_.

- ☐ (a) contaminated drain system
- ☒ (b) condensate drain system
- ☐ (c) auxiliary turbine bleed system
- ☐ (d) boiler drain system

*If choice b is selected set score to 1.*

**156.** (3.7.4.1.4-3) Which of the components listed prevents water from flowing back into the auxiliary exhaust line if the deaerating feed tank becomes flooded?

- ☒ (a) Check valve
- ☐ (b) Reverse-acting relief valve
- ☐ (c) Pumps
- ☐ (d) Exhaust piping

*If choice a is selected set score to 1.*

**157.** (3.7.4.1.4-4) Cooling water to the vent condenser in a DC heater is supplied by the \_\_\_\_\_.

- ☐ (a) salt water circulator
- ☒ (b) main and/or auxiliary condensate pump
- ☐ (c) feed booster pump
- ☐ (d) main feed pump

*If choice b is selected set score to 1.*

**158.** (3.7.4.1.5-1) In a main propulsion steam turbine installation, the condensate pump initially discharges to the \_\_\_\_\_.

- ☐ (a) deaerating feed tank
- ☒ (b) air ejector condenser
- ☐ (c) first stage heater
- ☐ (d) distillate tank

*If choice b is selected set score to 1.*

**159.** (3.7.4.1.5-2) The leakage of air into the pump casing by way of the packing gland of a condensate pump, is prevented by \_\_\_\_\_.

- ☐ (a) the vacuum in the pump suction
- ☐ (b) special packing in the stuffing box
- ☐ (c) an air seal line from the compressed air line
- ☒ (d) a water seal line to the packing gland

*If choice d is selected set score to 1.*

**160.** (3.7.4.1.5-3) Condensate pumps have distinctly noticeable characteristics and can usually be recognized by their \_\_\_\_\_.

- ☐ (a) speed-limiting governors and closed impellers
- ☒ (b) large suction chambers and impeller eyes
- ☐ (c) open impellers and power ends
- ☐ (d) multiple impellers and pump shaft positions

*If choice b is selected set score to 1.*

**161.** (3.7.4.2-1) If a ship is to be laid up for an indefinite period, the steam side of the main condenser should be \_\_\_\_\_.

- ☐ (a) left under a vacuum
- ☐ (b) filled with moist air
- ☒ (c) completely drained of water
- ☐ (d) pressurized to approximately 5 psig with nitrogen, 99.5% pure by volume

*If choice c is selected set score to 1.*

**162.** (3.7.4.3-1) Vapor blowing from the air ejector condenser vent may be caused by \_\_\_\_\_.

- ☐ (a) low condensate temperature
- ☒ (b) insufficient condensate flow
- ☐ (c) excessive condensate pump speed
- ☐ (d) excess makeup feed being taken into the system

*If choice b is selected set score to 1.*

**163.** (3.7.4.3-2) Scale in the air ejector first-stage nozzle could cause a decrease in the \_\_\_\_\_.

- ☐ (a) condensing temperature in the condenser
- ☐ (b) low pressure turbine exhaust temperature
- ☐ (c) air ejector steam supply pressure
- ☒ (d) condenser vacuum

*If choice d is selected set score to 1.*

**164.** (3.7.4.3-3) If the cooling water flow through the air ejector inter condensers and after condensers is inadequate, which of the problems listed will occur?

- ☐ (a) Air ejector nozzles will erode.
- ☒ (b) Main condenser absolute pressure will increase.
- ☐ (c) DC heater level will rise
- ☐ (d) After condenser will be flooded.

*If choice b is selected set score to 1.*

**165.** (3.7.4.3-4) Excessively hot water returning to an atmospheric drain tank indicates \_\_\_\_\_.

- ☐ (a) there is a loss of circulating water
- ☐ (b) a heating coil has ruptured
- ☒ (c) a steam trap is hung open
- ☐ (d) the condensate recirculating valve is open

*If choice c is selected set score to 1.*

**166.** (3.7.4.3-5) Dissolved oxygen in the condensate can result from \_\_\_\_\_.

- ☐ (a) steam leaks into the gland leak off
- ☒ (b) air leaks through the turbine glands
- ☐ (c) improper operation of the gland exhaust
- ☐ (d) vapor lock in the condensate pump

*If choice b is selected set score to 1.*

**167.** (3.7.4.3-6) Salt water contamination of condensate could occur at which component?

- ☐ (a) Inter condenser
- ☐ (b) DC heater
- ☐ (c) After condenser
- ☒ (d) Fresh water evaporator

*If choice d is selected set score to 1.*

**168.** (3.7.4.3-7) If the salinity indicator periodically registers high salinity in the main hot well, the cause may be \_\_\_\_\_.

- ☒ (a) a contaminated distilled water tank
- ☐ (b) leaking air ejector condenser tubes
- ☐ (c) excessive water pressure in the lube oil cooler
- ☐ (d) leaking tubes in the third-stage heater

*If choice a is selected set score to 1.*

**169.** (3.7.4.3-8) Which of the conditions listed could prevent a centrifugal condensate pump from developing its rated capacity?

- ☒ (a) Closing the water seal line to the packing gland.
- ☐ (b) Operating the pump with a positive suction head.
- ☐ (c) Venting the pump to the vacuum side of the condenser.
- ☐ (d) Flooding of the main condenser hot well.

*If choice a is selected set score to 1.*

**170.** (3.7.4.3-9) Excessive condensate depression can result in \_\_\_\_\_.

- ☐ (a) high condensate discharge temperature
- ☒ (b) decreased plant operating efficiency
- ☐ (c) insufficient condensate sub cooling
- ☐ (d) overheated air injectors

*If choice b is selected set score to 1.*

**171.** (3.7.4.3-10) While maneuvering out of port, you answer a stop bell. You notice a lot of steam coming out of the gland exhaust condenser vent, in addition to the main condenser hot well level being low. For this condition you should \_\_\_\_\_.

- ☐ (a) speed up the condensate pump
- ☒ (b) manually recirculate condensate and add some makeup feed
- ☐ (c) decrease gland sealing steam pressure
- ☐ (d) increase steam pressure to the air ejectors

*If choice b is selected set score to 1.*



**172.** (3.7.5.1-1) From which of the areas listed are condensate drains normally collected and returned to the low pressure drain system?

- ☐ (a) Steam systems operating in excess of 150 psi
- ☐ (b) Steam whistle separator/trap
- ☒ (c) Main and auxiliary air ejector after condensers
- ☐ (d) Each main feed pump steam supply line

*If choice c is selected set score to 1.*

**173.** (3.7.5.1-2) A basic comparison can be made between a low pressure evaporator operation and a main condenser with regards to the removal of non-condensable gases. The vacuum drag line for the main condenser is specifically connected in which area?

- ☐ (a) hot well
- ☐ (b) steam lane
- ☒ (c) air cooler section
- ☐ (d) main tube bank

*If choice c is selected set score to 1.*

**174.** (3.7.5.2-1) Which of the listed systems would be a potential source for the high pressure drain system?

- ☒ (a) Steam systems operating in excess of 150 psi
- ☐ (b) Galley steam tables
- ☐ (c) Laundry steam pressing machines
- ☐ (d) Fuel oil tank heating coils

*If choice a is selected set score to 1.*

**175.** (3.7.5.2-2) High pressure steam drains are normally discharged to the \_\_\_\_\_.

- ☐ (a) drain and inspection tank
- ☒ (b) DC heater
- ☐ (c) reserve feed tank
- ☐ (d) atmospheric drain line

*If choice b is selected set score to 1.*

**176.** (3.7.6.1-1) The property of a fuel oil which is a measurement of its available energy, is known as its \_\_\_\_\_.

- ☐ (a) viscosity index
- ☐ (b) cetane number
- ☐ (c) cetane index
- ☒ (d) heating value

*If choice d is selected set score to 1.*

**177.** (3.7.6.1-2) Which of the significant combustible elements of fuel oil is a major source of boiler corrosion?

- ☐ (a) Hydrogen
- ☐ (b) Oxygen
- ☐ (c) Carbon
- ☒ (d) Sulphur

*If choice d is selected set score to 1.*

**178.** (3.7.6.1-4) The minimum temperature requirements for fuel oil in storage tanks is related to the \_\_\_\_\_.

- ☒ (a) pumpability of the oil
- ☐ (b) size of the containment area in case of overflow
- ☐ (c) fire point of the oil
- ☐ (d) size of the vents

*If choice a is selected set score to 1.*

**179.** (3.7.6.1-4) The most harmful slag forming compounds found in fuel oils are \_\_\_\_\_.

- ☐ (a) calcium and silica
- ☐ (b) potassium and nickel
- ☒ (c) vanadium and sodium
- ☐ (d) iron and sulphur

*If choice c is selected set score to 1.*

**180.** (3.7.6.1-5) Which constituent of fuel oil determines the specific heat?

- ☐ (a) Sulphur
- ☒ (b) Hydrocarbons
- ☐ (c) Oxygen
- ☐ (d) Nitrogen

*If choice b is selected set score to 1.*

**181.** (3.7.6.1-6) Which combustible element in fuel oil is considered a significant and major source of air pollution?

- ☐ (a) Hydrogen
- ☒ (b) Sulfur
- ☐ (c) Vanadium
- ☐ (d) Nitrogen

*If choice b is selected set score to 1.*

**182.** (3.7.6.1-7) The BTU value of fuel oil is determined by a/an \_\_\_\_\_.

- ☐ (a) open cup test
- ☐ (b) hydrometer
- ☒ (c) calorimeter
- ☐ (d) viscosimeter

*If choice c is selected set score to 1.*

**183.** (3.7.6.1-8) The flash point of a residual fuel oil should be used to determine the highest temperature to which the oil may be heated \_\_\_\_\_.

- ☐ (a) in the recirculating line
- ☐ (b) for centrifuging
- ☐ (c) for atomizing
- ☒ (d) in a storage tank

*If choice d is selected set score to 1.*

**184.** (3.7.6.2.1-1) When testing boiler flue gas with a chemical absorption apparatus, to obtain accurate results \_\_\_\_\_.

- ☐ (a) run each analysis for at least 3 minutes
- ☐ (b) analyze for nitrogen content before oxygen content
- ☐ (c) purge the apparatus with air before use
- ☒ (d) prevent any air from contaminating the gas sample

*If choice d is selected set score to 1.*

**185.** (3.7.6.2.1-2) The absence of carbon monoxide in the flue gas of a boiler indicates \_\_\_\_\_.

- ☐ (a) low carbon content of fuel
- ☒ (b) efficient combustion
- ☐ (c) insufficient air
- ☐ (d) contaminated fuel oil

*If choice b is selected set score to 1.*

**186.** (3.7.6.2.1-3) When burning fuel oil in a boiler, a high CO<sub>2</sub> content is desired in the stack gas because \_\_\_\_\_.

- ☐ (a) efficient combustion is indicated even though the heat liberated is less than the heat produced by burning to CO
- ☐ (b) efficient combustion is indicated and the heat liberated is equal to the heat produced by the formation of CO
- ☐ (c) less excess air is required to produce CO<sub>2</sub> than CO
- ☒ (d) more heat is liberated by the production of CO<sub>2</sub> than CO

*If choice d is selected set score to 1.*

**187.** (3.7.6.2.1-5) A mechanical carbon dioxide recorder operates by detecting the difference between air and the \_\_\_\_\_.

- ☐ (a) soot content of the flue gases
- ☒ (b) specific weight of the flue gases
- ☐ (c) color of boiler flue gases
- ☐ (d) temperature of the flue gases

*If choice b is selected set score to 1.*

**188.** (3.7.6.2.1-6) A flue gas analysis is performed to determine the \_\_\_\_\_.

- ☐ (a) percentage of nitrogen by volume
- ☐ (b) carbon content of the fuel being burned
- ☐ (c) specific heat of combustion products
- ☒ (d) correct fuel/air ratio for efficient combustion

*If choice d is selected set score to 1.*

**189.** (3.7.6.2.1-7) Which of the following chemicals is used in an Orsat apparatus to absorb carbon dioxide?

- ☐ (a) Potassium chromate
- ☐ (b) Cuprous chloride
- ☐ (c) Pyrogalllic acid
- ☒ (d) Potassium hydroxide

*If choice d is selected set score to 1.*

**190.** (3.7.6.2.1-8) If an analysis of boiler flue gas determines there is no excess air for combustion, you should expect the nitrogen content of the flue gas to be approximately \_\_\_\_\_.

- ☐ (a) 10.5%
- ☐ (b) 21.0%
- ☒ (c) 79.0%
- ☐ (d) 14.0%

*If choice c is selected set score to 1.*

**191.** (3.7.6.2.1-9) Generally, a 12% to 14% content of carbon dioxide in boiler flue gases indicates \_\_\_\_\_.

- ☐ (a) a high vanadium content in the fuel oil
- ☐ (b) carbon deposits in the uptakes
- ☒ (c) proper combustion of the fuel oil
- ☐ (d) too much excess air

*If choice c is selected set score to 1.*

**192.** (3.7.6.3.1-1) The temperature of the fuel oil received during bunkering operations is critical in determining the \_\_\_\_\_.

- (a) expansion space to leave in a tank
- (b) flash point at which the fuel will burn
- (c) rate at which the fuel can be pumped during transfer operations
- (d) temperature to which the fuel must be heated

*If choice a is selected set score to 1.*

**193.** (3.7.6.3.2-1) When you are transferring fuel oil to the settling tanks, precautions to be observed should include \_\_\_\_\_.

- (a) sounding the tanks frequently and reducing the transfer rate as the level approaches maximum fill
- (b) maintaining a high transfer rate until a slight trickle of oil is observed flowing from the overflow line
- (c) plugging gooseneck tank vents to prevent accidental overflow
- (d) maintaining a supply of chemical dispersant to cleanup minor oil spills adjacent to the ship

*If choice a is selected set score to 1.*

**194.** (3.7.6.3.2-2) When you are transferring fuel oil from one double bottom tank to another, precautions to be observed should include \_\_\_\_\_.

- (a) sounding the tanks frequently and reducing the transfer rate while topping off
- (b) maintaining a supply of chemical dispersant to cleanup minor oil spills adjacent to the ship
- (c) maintaining a high transfer rate until a slight trickle of oil is observed flowing from the overflow line
- (d) plugging gooseneck tank vents to prevent accidental overflow

*If choice a is selected set score to 1.*

**195.** (3.7.6.3.2-3) Which of the pumps listed takes fuel oil suction from the double bottom tanks and discharges it to the settling tanks?

- (a) Centrifugal type general service pump
- (b) Fuel oil transfer pump
- (c) Settler service pump
- (d) Fuel oil service pump

*If choice b is selected set score to 1.*

**196.** (3.7.6.3.3-1) The main reason for having a low suction line on the fuel oil service or settling tanks is to \_\_\_\_\_.

- (a) facilitate water removal
- (b) prevent loss of suction during rough weather
- (c) decrease suction head on the pump
- (d) increase the amount of fuel available for use

*If choice a is selected set score to 1.*

**197.** (3.7.6.3.3-2) Which of the following actions should be taken FIRST when water is found in the fuel oil settling tank?

- (a) Shift pump suction to an alternate settling tank.
- (b) Shift to alternate or standby fuel oil service pump.
- (c) Determine the extent of water contamination by reading the pneumerators.
- (d) Sound the settling tank with water indicating paste.

*If choice a is selected set score to 1.*

**198.** (3.7.6.3.3-3) Fuel oil is transferred to the settling tanks for \_\_\_\_\_.

- (a) heating to allow water and sediment to settle out
- (b) heating to the correct temperature for proper burner atomization
- (c) the purpose of removing any volatile gases present in the fuel
- (d) purging of any large air bubbles that have formed

*If choice a is selected set score to 1.*

**199.** (3.7.7.1.1-1) The relief valve on the discharge side of the fuel oil service pump may discharge directly to the suction side of the pump, or to the \_\_\_\_\_.

- (a) double bottom fuel tank
- (b) fuel oil heater inlet
- (c) fuel oil settling tank
- (d) oil header return line

*If choice c is selected set score to 1.*

**200.** (3.7.7.1.1-2) Pumps normally used for fuel oil service are \_\_\_\_\_.

- (a) explosion proof gear pumps
- (b) positive displacement rotary pumps
- (c) nonvented plunger pumps
- (d) two-stage centrifugal pumps

*If choice b is selected set score to 1.*

**201.** (3.7.7.1.2-1) Valve "H" shown in the illustration, functions to \_\_\_\_\_. Illustration SG-0009

- (a) provide a quick shut off of fuel to the boiler
- (b) recirculate fuel oil during start-up
- (c) prevent a backflow from the manifold
- (d) regulate the amount of fuel burned

*If choice a is selected set score to 1.*

**202.** (3.7.7.1.2-2) The valve located between the fuel oil header and the burner valve is known as the \_\_\_\_\_.

- ☐ (a) return valve
- ☐ (b) register valve
- ☐ (c) header valve
- ☒ (d) root valve

*If choice d is selected set score to 1.*

**203.** (3.7.7.1.3.1-1) The primary purpose of the sprayer plate in a mechanical atomizing oil burner is to \_\_\_\_\_.

- ☐ (a) assist in mixing atomizing steam with the fuel
- ☐ (b) prevent primary air mixing with the fuel
- ☐ (c) completely mix air with the fuel
- ☒ (d) produce a fine, swirling, uniform fuel mist

*If choice d is selected set score to 1.*

**204.** (3.7.7.1.3.1-2) The amount of oil atomized by a straight mechanical fuel oil burner depends on the sprayer plate size and the \_\_\_\_\_.

- ☐ (a) oil return pressure
- ☐ (b) furnace air pressure
- ☒ (c) fuel oil pressure
- ☐ (d) forced draft pressure

*If choice c is selected set score to 1.*

**205.** (3.7.7.1.3.1-3) The illustrated burner atomizer assembly is \_\_\_\_\_. Illustration SG-0022

- ☐ (a) an example of a rotary cup type atomizer
- ☐ (b) used only for variable load steam atomization
- ☐ (c) used in a return flow type burner management system
- ☒ (d) straight mechanical

*If choice d is selected set score to 1.*

**206.** (3.7.7.1.3.2-1) In a steam assist fuel oil atomizer, the steam pressure is higher than the oil pressure at \_\_\_\_\_.

- ☐ (a) design boiler load
- ☐ (b) high fuel viscosity
- ☐ (c) low fuel viscosity
- ☒ (d) minimum boiler load

*If choice d is selected set score to 1.*

**207.** (3.7.7.1.3.2-2) In most installations, the firing rate of a boiler using steam atomization is indicated by the \_\_\_\_\_.

- ☐ (a) burner register opening
- ☒ (b) fuel oil supply pressure
- ☐ (c) fuel oil return pressure
- ☐ (d) steam atomization temperature

*If choice b is selected set score to 1.*

**208.** (3.7.7.1.3.2-3) In a steam assist atomizer, the fuel oil/steam mix takes place entirely within the \_\_\_\_\_.

- ☐ (a) fuel oil swirlers
- ☐ (b) whirling chamber
- ☒ (c) mixing chamber
- ☐ (d) tangential slots

*If choice c is selected set score to 1.*

**209.** (3.7.7.1.3.2-4) Compared to the return flow oil burner system, an internally mixed steam atomizer requires \_\_\_\_\_.

- ☐ (a) greater turbulence in the air/oil stream
- ☒ (b) less excess air
- ☐ (c) higher air velocity
- ☐ (d) higher fuel oil viscosity

*If choice b is selected set score to 1.*

**210.** (3.7.7.1.3.2-5) Boilers equipped with steam atomizers can operate over a wide load range without cutting burners in and out because \_\_\_\_\_.

- ☐ (a) atomizing steam pressure is held constant for all load ranges
- ☐ (b) steam maintains the oil at the fire point temperature
- ☐ (c) it is not necessary to regulate fuel oil pressure at the burners with this system
- ☒ (d) steam velocity aids in the atomizing of fuel oil over a wide range of fuel pressures

*If choice d is selected set score to 1.*

**211.** (3.7.7.1.3.2-6) A boiler has a steam delivery capacity of 100,000 pounds per hour, and is equipped with four steam atomizing burners. If the load range of the burners is 4 to 1, this means that \_\_\_\_\_.

- ☐ (a) the boiler may be operated down to 25,000 pounds per hour only after three burners are secured
- ☒ (b) the boiler may be operated down to 25,000 pounds per hour without securing any burners
- ☐ (c) all four burners combined can supply up to 400,000 pounds of steam per hour
- ☐ (d) if two burners are operating, steam output will be a minimum of 50,000 pounds per hour

*If choice b is selected set score to 1.*



**212.** (3.7.7.1.3.3-1) According to the illustration, what part number identifies the "air door handle"?  
Illustration SG-0016

- ☐ (a) 6
- ☐ (b) 4
- ☒ (c) 12
- ☐ (d) 7

*If choice c is selected set score to 1.*

**213.** (3.7.7.1.3.3-2) According to the illustration, what part number identifies the "igniter"? Illustration  
SG-0016

- ☐ (a) 3
- ☒ (b) 2
- ☐ (c) 9
- ☐ (d) 7

*If choice b is selected set score to 1.*

**214.** (3.7.7.1.3.3-3) In an air register assembly, the majority of air passes through the \_\_\_\_\_.

- ☒ (a) stationary air foil or blade cone
- ☐ (b) distance piece
- ☐ (c) diffuser or impeller
- ☐ (d) atomizer assembly

*If choice a is selected set score to 1.*

**215.** (3.7.7.1.3.3-4) According to the illustration, what part number identifies the "diffuser"? Illustration  
SG-0016

- ☐ (a) 7
- ☐ (b) 3
- ☐ (c) 1
- ☒ (d) 9

*If choice d is selected set score to 1.*

**216.** (3.7.7.1.3.3-5) The purpose of a 'peep' hole in the boiler casing is to \_\_\_\_\_.

- ☐ (a) examine the condition of the refractory cones
- ☐ (b) check for excess smoke in the stack
- ☐ (c) check the operation of the soot blowers
- ☒ (d) examine the condition of the flame

*If choice d is selected set score to 1.*

**217.** (3.7.7.1.4-1) The fins on the tubes of a fin type fuel oil heater are provided to \_\_\_\_\_.

- ☐ (a) decrease fuel flow
- ☒ (b) increase heater efficiency
- ☐ (c) prevent tube erosion
- ☐ (d) clean the fuel oil

*If choice b is selected set score to 1.*

**218.** (3.7.7.1.4-2) When warming up a fuel oil service system, you should open the steam supply to the fuel oil heaters \_\_\_\_\_.

- ☐ (a) before you start the fuel oil service pump
- ☒ (b) after you start the fuel oil service pump
- ☐ (c) only if the settlers are incapable of heating the oil
- ☐ (d) before you open the recirculating valve

*If choice b is selected set score to 1.*

**219.** (3.7.7.3.1-1) Boiler furnace brickwork can be fractured and broken by thermal shock caused by \_\_\_\_\_.

- ☐ (a) allowing the furnace to cool too slowly
- ☒ (b) leaving the registers open on a hot boiler
- ☐ (c) load changes on the boiler while answering bells
- ☐ (d) cold feed water passing through the boiler economizer

*If choice b is selected set score to 1.*

**220.** (3.7.7.3.1-2) Which of the conditions listed can cause the flame of a mechanically atomized burner to be blown away from the burner tip when you are attempting to light off?

- ☒ (a) The diffuser is burned out.
- ☐ (b) Insufficient excess air is being supplied to the furnace.
- ☐ (c) Fuel oil viscosity is too low.
- ☐ (d) The secondary air cone is improperly adjusted.

*If choice a is selected set score to 1.*

**221.** (3.7.7.3.1-3) Fluctuations in the atomizing steam pressure at the burners could be caused by a/an \_\_\_\_\_.

- ☐ (a) partially opened recirculating valve
- ☐ (b) partially closed atomizing fuel valve
- ☐ (c) incorrectly assembled air register
- ☒ (d) malfunctioning steam trap in the atomizing steam system

*If choice d is selected set score to 1.*

**222.** (3.7.7.3.1-4) In a multi-burner firebox, a burner tip with a worn and enlarged orifice will \_\_\_\_\_.

- (a) cause smokeless and flameless combustion
- (b) result in an uneven flow of oil through the burner
- (c) have no effect on the flow of oil if the proper pressure is maintained
- (d) cause a high fuel oil return line back pressure

*If choice b is selected set score to 1.*

**223.** (3.7.7.3.1-5) If the temperature of the fuel oil entering an atomizer is too low, the burner will \_\_\_\_\_.

- (a) require more fuel for atomization
- (b) produce smoke white
- (c) require more excess air for combustion
- (d) produce heavy black smoke at any load condition

*If choice d is selected set score to 1.*

**224.** (3.7.7.3.2-1) A leaky fuel oil heater relief valve could be indicated by an increase in the \_\_\_\_\_.

- (a) sludge tank level
- (b) discharge piping temperature
- (c) contaminated drain tank level
- (d) fuel oil service pump pressure

*If choice b is selected set score to 1.*

**225.** (3.7.7.3.2-2) Condensate accumulation in the steam side of a fuel oil heater could result in \_\_\_\_\_.

- (a) scale accumulation in an operating heater
- (b) reduced heating capacity in an operating heater
- (c) water contamination of the fuel oil
- (d) annealing of the heater tube bundles

*If choice b is selected set score to 1.*

**226.** (3.7.7.3.2-3) The rate of fouling on the oil side of a fuel oil heater is inversely related to the \_\_\_\_\_.

- (a) shape of the heating coils in the heater
- (b) quality of steam flowing through the heater
- (c) pressure on the oil in the heater
- (d) flow rate of fuel oil through the heater

*If choice d is selected set score to 1.*

**227.** (3.7.7.3.2-4) If oil is found in the main fuel oil heater steam drain system, which of the actions listed should be taken first?

- ☐ (a) Change over fuel supply to diesel fuel.
- ☐ (b) Bottom blow the boiler using the continuous blow line.
- ☒ (c) Shift over to the standby heater and monitor contaminated drain tank for additional traces of oil.
- ☐ (d) Shift over to the low fuel oil suction on the day tank.

*If choice c is selected set score to 1.*

**228.** (3.7.8.1-1) A boiler with a water capacity of 10 tons, generates steam at the rate of 30 tons per hour. If the feed water quality is 0.5 ppm, the concentration of solids will increase 1.5 ppm every hour. What would be the increase in the concentration of solids w

- ☐ (a) 48 ppm
- ☒ (b) 36 ppm
- ☐ (c) 24 ppm
- ☐ (d) 12 ppm

*If choice b is selected set score to 1.*

**229.** (3.7.8.1-2) Testing boiler water for chloride content will indicate the amount of \_\_\_\_\_.

- ☐ (a) total alkalinity in the water
- ☐ (b) methyl orange that should be added
- ☒ (c) dissolved salts from sea contamination
- ☐ (d) phosphates present in the water

*If choice c is selected set score to 1.*

**230.** (3.7.8.1-3) A sample of boiler water can be chemically tested for alkalinity by initially adding a few drops of phenolphthalein and then slowly titrating the water sample until the \_\_\_\_\_.

- ☒ (a) sample color changes from pink to clear
- ☐ (b) water sample pH reaches 10.5
- ☐ (c) entire concentration of chlorides have been neutralized
- ☐ (d) sample color changes from clear to pink

*If choice a is selected set score to 1.*

**231.** (3.7.8.1-4) Phenolphthalein is used as an indicator to test boiler water for \_\_\_\_\_.

- ☐ (a) chloride content
- ☐ (b) hardness
- ☒ (c) alkalinity
- ☐ (d) hydrazine

*If choice c is selected set score to 1.*

**232.** (3.7.8.1-5) A dissolved oxygen concentration of 8.0 ppm represents \_\_\_\_\_.

- ☐ (a) 8 tons of oxygen dissolved in 1,000,000 pounds of water
- ☐ (b) 8 lbs of oxygen dissolved in 1,000,000 tons of water
- ☒ (c) 8 ounces of oxygen dissolved in 1,000,000 ounces of water
- ☐ (d) 80 ounces of oxygen dissolved in 100,000 ounces of water

*If choice c is selected set score to 1.*

**233.** (3.7.8.2-1) Calcium minerals in boiler water are precipitated out of solution by the use of which of the listed chemicals?

- ☐ (a) Phenolphthalein
- ☐ (b) Caustic soda
- ☐ (c) Sodium hydroxide
- ☒ (d) Sodium phosphate

*If choice d is selected set score to 1.*

**234.** (3.7.8.2-2) Although accurate tests of boiler water for dissolved oxygen are difficult to obtain on board ship, you can be fairly certain of proper oxygen removal by \_\_\_\_\_.

- ☒ (a) maintaining a normal level of scavenging agents
- ☐ (b) maintaining low boiler water pH
- ☐ (c) testing frequently for total dissolved solids
- ☐ (d) giving the boiler frequent surface blows

*If choice a is selected set score to 1.*

**235.** (3.7.8.2-3) When a boiler water test indicates a pH value of 6, you should \_\_\_\_\_.

- ☒ (a) chemically treat to raise the pH to normal level
- ☐ (b) check the DC heater for possible malfunction
- ☐ (c) begin a continuous boiler blow down
- ☐ (d) chemically treat to lower the pH to normal level

*If choice a is selected set score to 1.*

**236.** (3.7.8.2-4) To minimize metal corrosion, boiler water is best kept \_\_\_\_\_.

- ☐ (a) slightly acidic
- ☐ (b) neutral
- ☐ (c) fairly acidic
- ☒ (d) alkaline

*If choice d is selected set score to 1.*

**237.** (3.7.8.3-1) If boiler water chemicals are decreasing in one boiler and increasing in the other boiler, while both are steaming at normal rates, a leak probably exists in the \_\_\_\_\_.

- ☐ (a) superheater tubes
- ☐ (b) economizer tubes
- ☐ (c) feed water crossover line
- ☒ (d) internal desuperheater flange

*If choice d is selected set score to 1.*

**238.** (3.7.8.3-2) Carbon dioxide dissolved in boiler water is dangerous in a modern power boiler because the gas \_\_\_\_\_.

- ☐ (a) combines with oxygen to cause severe waterside scaling
- ☒ (b) forms carbonic acid which attacks the watersides
- ☐ (c) combines with sulfates to cause severe waterside pitting
- ☐ (d) breaks the magnetic iron oxide film inside boiler tubes

*If choice b is selected set score to 1.*

**239.** (3.7.8.3-3) Excessive alkalinity of boiler water will cause \_\_\_\_\_.

- ☒ (a) caustic embrittlement
- ☐ (b) sodium sulfite reacting with dissolved oxygen
- ☐ (c) calcium carbonate precipitation
- ☐ (d) scale formation

*If choice a is selected set score to 1.*

**240.** (3.7.8.3-4) Excessive carbon dioxide formed by improper chemical treatment in the boiler may cause corrosion in the \_\_\_\_\_.

- ☐ (a) boiler superheater tubes
- ☐ (b) boiler generating tubes
- ☒ (c) condensate lines
- ☐ (d) main and auxiliary steam lines

*If choice c is selected set score to 1.*

**241.** (3.7.8.3-5) A malfunction in the DC heater is indicated by \_\_\_\_\_.

- ☐ (a) condensate coming in contact with steam inside the heater
- ☐ (b) air flowing from vent condenser vent
- ☒ (c) the boiler requiring excessive amounts of oxygen scavenging chemicals
- ☐ (d) water and steam entering the DC heater at different temperatures

*If choice c is selected set score to 1.*

**242.** (3.7.9.1.1-1) Flame scanners are used with boiler combustion control systems to monitor flame quality and to \_\_\_\_\_.

- ☐ (a) secure the fuel oil service pump in the event of a floor fire
- ☐ (b) regulate the fuel/air ratio controller for more efficient combustion
- ☒ (c) shut off the fuel supply if flame failure is detected
- ☐ (d) secure the forced draft fan in the event of a flame failure

*If choice c is selected set score to 1.*

**243.** (3.7.9.1.1-2) The photoelectric cell installed as part of the combustion safety controls of an automatically fired boiler will \_\_\_\_\_.

- ☐ (a) close the control circuit upon sensing a flame failure
- ☐ (b) open the control circuit upon sensing an intense flame
- ☐ (c) control the modulating pressure control circuit
- ☒ (d) sense light from the burner flame

*If choice d is selected set score to 1.*

**244.** (3.7.9.1.1-3) Which of the following represents a significant system limitation to be aware of when a burner management system is operated in the 'HAND' mode?

- ☐ (a) The flame failure alarm cannot function when the boiler is 'HAND' fired.
- ☒ (b) Some boiler safety interlocks are bypassed when the boiler is 'HAND' fired.
- ☐ (c) The burner sequence control is fully automatic even in the 'HAND' mode.
- ☐ (d) The burner is not capable of maintaining a high firing rate when the boiler is in the 'HAND' mode.

*If choice b is selected set score to 1.*

**245.** (3.7.9.1.1-4) In automatic combustion control systems, increasing or decreasing a loading pressure by a set amount is called \_\_\_\_\_.

- ☒ (a) biasing
- ☐ (b) loading
- ☐ (c) relaying
- ☐ (d) transmitting

*If choice a is selected set score to 1.*

**246.** (3.7.9.1.1-5) As found in a basic pneumatic automatic combustion control system, the function of a standardizing relay is to \_\_\_\_\_.

- ☐ (a) introduce a control for maintaining constant superheated steam temperature regardless of boiler load
- ☒ (b) introduce a control for maintaining constant steam pressure regardless of boiler load
- ☐ (c) provide a backup means for manual control of the system
- ☐ (d) control the boiler drum water level within acceptable limits regardless of the load

*If choice b is selected set score to 1.*

**247.** (3.7.9.1.1-6) In an automatically fired boiler, the steam pressure regulator controls the supply of fuel oil to the burners by responding to variations in the \_\_\_\_\_.

- (a) steam header pressure
- (b) steam drum water level
- (c) burner flame intensity
- (d) master fuel oil solenoid valve position

*If choice a is selected set score to 1.*

**248.** (3.7.9.1.1-7) Fine adjustments to a boiler combustion control system, to bring about near perfect combustion, should be made by manually adjusting the \_\_\_\_\_.

- (a) fuel oil back pressure
- (b) forced draft fan dampers
- (c) air volume regulators
- (d) fuel/air ratio knob

*If choice d is selected set score to 1.*

**249.** (3.7.9.3.1-4) If an automatically fired burner ignites, but repeatedly goes out within two seconds, the cause could be a/an \_\_\_\_\_.

- (a) excessively high fuel oil temperature
- (b) faulty pressure signal to the time delay relay circuit
- (c) dirty flame scanner window
- (d) burned out solenoid coil in the low fire oil valve

*If choice c is selected set score to 1.*

**250.** (3.7.9.3.1-5) Modern day boiler automation allows bypassing the "flame safeguard" system to permit a burner to have a "trial for ignition" period during burner light-off. This period may not exceed \_\_\_\_\_.

- (a) 15 seconds
- (b) 30 seconds
- (c) 10 seconds
- (d) 5 seconds

*If choice a is selected set score to 1.*

**251.** (3.7.9.3.1-3) In a boiler automation system, if a burner fuel oil solenoid valve continually trips closed under normal steaming conditions, you should \_\_\_\_\_.

- (a) wedge the valve in the open position and reduce the fuel oil pressure at that burner
- (b) bypass the solenoid valve and enter the fact in the logbook
- (c) wedge the valve in the open position and report it to the chief engineer
- (d) secure the burner and determine the cause of the valve failure

*If choice d is selected set score to 1.*



**252.** (3.7.9.3.1-2) While your vessel is steaming with one boiler, the automatic combustion control system sensing line for the idle boiler is accidentally opened. How will this affect the steaming boiler?

- (a) The water level will drop.
- (b) The water level will rise.
- (c) The steam pressure will drop.
- (d) The steam pressure will rise.

*If choice d is selected set score to 1.*

**253.** (3.7.9.3.1-1) While trying to light off a burner on a semi-automated boiler, you note that the fuel oil solenoid valve at the burner will not stay open. Which of the following conditions could cause this problem?

- (a) The flame scanner is adjusted for excessive time delay in the ignition trial circuit.
- (b) The forced draft air supply has failed.
- (c) The fuel oil pressure at that burner is too high.
- (d) The solenoid coil is energized causing the valve to remain closed.

*If choice b is selected set score to 1.*

**254.** (3.7.11.1-3) If it should become necessary to abandon a compartment because of the danger of a large steam leak on a boiler, which of the following actions represents the best avenue of escape?

- (a) Escape through another compartment on a higher level.
- (b) Escape by way of a fire room ladder to the outer deck.
- (c) Use fire room elevator to an upper deck.
- (d) Escape through another compartment on a lower level.

*If choice d is selected set score to 1.*

**255.** (3.7.11.1-1) Which of the precautions listed should be taken when gagging a boiler safety valve?

- (a) Tighten the gag only finger tight to prevent damage to the valve stem, disc or seat.
- (b) Tighten the gag only with the special wrench supplied with the gag.
- (c) Do not allow the gag to contact the safety valve stem.
- (d) Ensure that all moving parts of the safety valve are free to move before installing the gag.

*If choice a is selected set score to 1.*

**256.** (3.7.11.1-2) Which of the listed operating practices is considered as safe, and should be followed when opening and inspecting the waterside of a boiler?

- (a) Ventilate the waterside until completely dry.
- (b) Open the water drum manhole before opening the steam drum manhole.
- (c) Wire all valves closed that connect to other boilers.
- (d) Remove handhole plate dogs with a slugging wrench.

*If choice c is selected set score to 1.*

**257.** (3.7.12.1-8) If a major flareback occurs to a boiler, which of the following actions should be immediately taken?

- ☐ (a) Purge the fuel oil system.
- ☐ (b) Secure all fire room ventilation.
- ☐ (c) Secure the forced draft fan.
- ☒ (d) Secure the fuel to the burners.

*If choice d is selected set score to 1.*

**258.** (3.7.12.1-6) Which of the following actions should be carried out if the boiler water level is falling due to a tube failure?

- ☐ (a) Start the standby feed pump and feed the boiler using two feed pumps.
- ☐ (b) Open the auxiliary feed stop and check for extra feed.
- ☒ (c) Secure the fires and try to maintain the water level.
- ☐ (d) Speed up the feed pump to keep the water level up while firing the boiler.

*If choice c is selected set score to 1.*

**259.** (3.7.12.1-4) Which action should be taken if the water level in the boiler gage glass drops out of sight and the burners fail to secure automatically?

- ☐ (a) Repair the feed water regulator.
- ☒ (b) Trip the master solenoid.
- ☐ (c) Blow down the gage glass.
- ☐ (d) Increase the feed pump speed.

*If choice b is selected set score to 1.*

**260.** (3.7.12.1-2) Which of the casualties listed is apt to occur immediately after a high water casualty?

- ☐ (a) Excessive steam pressure
- ☒ (b) Water carryover to the turbines
- ☐ (c) Excessive superheater temperature
- ☐ (d) Massive tube failure

*If choice b is selected set score to 1.*

**261.** (3.7.12.1-1) While underway, the boiler water level in a steaming boiler begins dropping rapidly and cannot be kept at the normal level by standard practices. The engineer's next action should be to \_\_\_\_\_.

- ☐ (a) blow down the gage glass to find the true water level
- ☒ (b) secure the fires and then secure the main feed stop/check valve to the boiler
- ☐ (c) continue to speed up the feed pump to raise the water level
- ☐ (d) secure the steam stop and then secure the fires

*If choice b is selected set score to 1.*

**262.** (3.7.12.2-1) Under EMERGENCY operating conditions, the proper valve positions for controlling feed water to the boiler should be the \_\_\_\_\_.

- (a) auxiliary stop valve fully open and the auxiliary stop-check valve used to regulate the amount of flow
- (b) auxiliary stop and stop-check valves fully open and the feed pump speed used to regulate the amount of flow
- (c) auxiliary stop-check valve fully open and the auxiliary stop valve regulated by the feed water regulator
- (d) auxiliary stop-check valve fully open and the auxiliary stop valve used to regulate the amount of flow

*If choice a is selected set score to 1.*

**263.** (3.7.12.2-2) ) In the event of a failure of the pneumatic control system, a multi-element feed water regulator is designed to operate as a \_\_\_\_\_.

- (a) manually controlled feed water regulator
- (b) constant-pressure regulator
- (c) thermo-hydraulic feed water regulator
- (d) constant-volume feed water regulator

*If choice a is selected set score to 1.*

**264.** (3.7.12.2-3) One boiler of a two boiler plant has ruptured a tube and the water cannot be maintained in sight in the gage glass. After securing the fires, your next action should be to \_\_\_\_\_.

- (a) secure the feed water supply to the boiler
- (b) close the main steam stop
- (c) secure the forced draft fans
- (d) stop the fuel oil service pump

*If choice a is selected set score to 1.*

**265.** (3.7.13.1-1) When preparing to hydrostatically test water-tube boilers, you should \_\_\_\_\_.

- (a) remove all inspection plates and manhole covers as required by the marine inspector
- (b) make arrangements for simultaneously testing main and auxiliary steam stops with water and steam pressure
- (c) have the boiler warmed to a temperature not exceeding 100°F (37.8°C)
- (d) fill the boiler with water not less than 70°F (21.1°C), nor more than 160°F (71.1°C)

*If choice d is selected set score to 1.*

**266.** (3.7.13.1-2) Which of the following statements is true concerning boiler inspections?

- (a) If the thickness found as a result of gauging is less than original thickness, the boiler must be condemned.
- (b) The marine inspector may require any boiler to be drilled to determine its actual thickness any time its safety is in doubt.
- (c) At the first inspection for certification after a water-tube boiler has been installed for ten years, it shall be gauged by drilling to determine the actual extent of deterioration.
- (d) Any user of a nondestructive testing device must demonstrate that results with an accuracy of plus or minus one percent are consistently obtainable.

*If choice b is selected set score to 1.*

**267.** (3.7.13.1-3) According to 46 CFR Part 61, which of the following statements is true concerning the inspection of water-tube boilers?

- (a) All boiler mounting studs or bolts shall be removed for examination by a Coast Guard inspector every 4 years after initial inspection.
- (b) Boiler mountings attached to boiler nozzles must be opened and removed for examination every 8 years.
- (c) Boiler mountings attached directly to the boiler plating by screwed studs and nuts shall be removed and examined every 10 years.
- (d) All mountings shall be opened up and examined by a Coast Guard inspector at eight year intervals after the initial inspection.

*If choice c is selected set score to 1.*

**268.** (3.7.13.1-4) Which of the following statements represents the Coast Guard Regulation regarding a boiler installation in which the superheater outlet temperature exceeds 850°F?

- (a) All mountings, fittings, valves, or other superheater attachments must be of malleable cast iron.
- (b) Visible and audible alarms indicating excessive superheat shall be provided.
- (c) Safety valves are to be set at 110% of the highest setting of the safety valves on the drum.
- (d) A device, actuated by inlet static pressure and designed to function by the bursting of a pressure retaining disk, must be fitted at the outlet of the superheater.

*If choice b is selected set score to 1.*

**269.** (3.7.13.1-5) Which of the Coast Guard publications listed contain the information regarding allowable repairs to boilers installed on cargo vessels?

- (a) Marine Engineering Regulations
- (b) Rules and Regulations for Cargo and Miscellaneous Vessels
- (c) Manufacturer's Instruction Manual
- (d) Modern Marine Engineer's Manual

*If choice a is selected set score to 1.*

**270.** (3.7.13.1-6) According to Coast Guard Regulations (46 CFR), which of the following is classified as a boiler mounting?

- (a) Escape piping drain valve
- (b) Main feed check valve
- (c) Blow off valve
- (d) Soot blower element

*If choice c is selected set score to 1.*

**271.** (3.7.13.1-7) Coast Guard Regulations (46 CFR) state that main propulsion water-tube boilers are not required to be fitted with a surface blow off valve if the design pressure is \_\_\_\_\_.

- (a) 300 psig (2169 kPa) or over
- (b) 550 psig (3893 kPa) or over
- (c) 500 psig (3548 kPa) or over
- (d) 350 psig (2413 kPa) or over

*If choice d is selected set score to 1.*

**272.** (3.7.13.2-1) Coast Guard Regulations (46 CFR Part 56) permit copper pipe to be used for steam service subjected to a maximum pressure and temperature of \_\_\_\_\_.

- (a) 350 psi and 460°F
- (b) 350 psi and 406°F
- (c) 250 psi and 406°F
- (d) 250 psi and 460°F

*If choice c is selected set score to 1.*

**273.** (3.7.13.2-2) Coast Guard Regulations (46 CFR) regarding hydrostatic testing of main steam piping state that \_\_\_\_\_.

- (a) the hydrostatic test shall be applied from the boiler drum to the throttle valve
- (b) the hydrostatic test pressure must be maintained on the piping for a minimum of one hour
- (c) not less than fifty percent of the lagging shall be removed each time the hydrostatic test is applied
- (d) a pipe with a nominal size of six inches or more is not required to be hydrostatically tested

*If choice a is selected set score to 1.*

**274.** (3.7.13.2-3) According to Coast Guard Regulations (46 CFR), which of the following steam piping conditions, subjected to main boiler pressure, is exempted from hydrostatic testing?

- (a) All piping equipped with a safety or relief valve.
- (b) All piping with a nominal size of 3 inches or less.
- (c) All piping to the ship's service generators.
- (d) All piping from the main steam stop to the throttle valve.

*If choice b is selected set score to 1.*

**275.** (3.7.13.3-1) If the maximum steam generating capacity of a boiler is increased Coast Guard Regulations (46 CFR) require that the safety valve's \_\_\_\_\_.

- ☐ (a) lifting pressure be increased
- ☐ (b) blow down be reduced
- ☒ (c) relieving capacity be checked
- ☐ (d) reseating pressure be increased

*If choice c is selected set score to 1.*

**276.** (3.7.13.3-2) Coast Guard Regulations, 46 CFR Part 54, require steam safety and relief valves to be provided with a substantial lifting device, capable of lifting the disc from its seat at what percentage of the set pressure?

- ☐ (a) 0%
- ☐ (b) 90%
- ☒ (c) 75%
- ☐ (d) 25%

*If choice c is selected set score to 1.*

**277.** (3.7.13.3-3) Coast Guard Regulations (46 CFR) require that the final setting of boiler safety valves be conducted in presence of the \_\_\_\_\_.

- ☐ (a) Chief Engineer
- ☐ (b) OCMI
- ☐ (c) COTP
- ☒ (d) Marine Inspector

*If choice d is selected set score to 1.*

**278.** (3.7.13.3-4) The MAWP of a boiler is 900 psi and the normal drop across the superheater is 20 psi. If the superheater safety valve is set to lift at 825 psi, the minimum settings of the drum safety valves allowed by Coast Guard Regulations would be \_\_\_\_\_.

- ☐ (a) 875 psi
- ☐ (b) 900 psi
- ☒ (c) 850 psi
- ☐ (d) 825 psi

*If choice c is selected set score to 1.*

**279.** (3.7.13.3-5) A boiler superheater safety valve is set to lift at 450 psi (3102 kPa). Coast Guard Regulations (46 CFR) require that if there is a pressure drop of 10 psi (69 kPa) across the superheater, the drum safety valve should set to lift at a pressure of \_\_\_\_\_.

- ☐ (a) 450 psi (3102 kPa)
- ☐ (b) 455 psi (3137 kPa)
- ☒ (c) 465 psi (3206 kPa)
- ☐ (d) 460 psi (3171 kPa)

*If choice c is selected set score to 1.*

**280.** (3.7.13.3-6) The safety valve nominal size for propulsion boilers and superheaters must be not less than 1 1/2 inches and not more than 4 inches. The term 'nominal size' refers to the \_\_\_\_\_.

- ☐ (a) free spring length
- ☒ (b) diameter of the inlet opening
- ☐ (c) diameter of the huddling chamber
- ☐ (d) diameter of the feather

*If choice b is selected set score to 1.*

**281.** (3.7.13.3-7) Coast Guard Regulations (46 CFR) concerning superheater safety valves require that the valve \_\_\_\_\_.

- ☐ (a) is not set at a pressure less than the feed pump relief valve
- ☐ (b) can only be operated by a pilot valve
- ☒ (c) nominal size is not less than 1.5 inches nor more than 4 inches
- ☐ (d) be set at a pressure higher than the drum safety valves

*If choice c is selected set score to 1.*

**282.** (3.7.13.3-8) Coast Guard Regulations (46 CFR) concerning marine boilers, require the installation of a safety valve on the \_\_\_\_\_.

- ☒ (a) superheated steam outlet
- ☐ (b) desuperheated steam outlet
- ☐ (c) preheated steam outlet
- ☐ (d) auxiliary steam outlet

*If choice a is selected set score to 1.*

**283.** (3.7.13.3-9) Coast Guard regulations require that the relieving capacity of boiler safety valves must be checked \_\_\_\_\_.

- ☐ (a) at least once every 4 years
- ☐ (b) at least once a year
- ☐ (c) when repairs have been made to the safety valves
- ☒ (d) when the generating capacity of the boiler is increased

*If choice d is selected set score to 1.*

**284.** (3.7.13.3-10) Coast Guard Regulations (46 CFR) permit repairs and adjustments to boiler safety valves while installed on a main propulsion boiler and may be made by \_\_\_\_\_.

- ☒ (a) the chief engineer in an emergency
- ☐ (b) any competent person on the ship
- ☐ (c) only the safety valve manufacturer
- ☐ (d) an approved repair facility only

*If choice a is selected set score to 1.*

**285.** (3.7.13.4-1) Coast Guard Regulations (46 CFR) require the duplex fuel oil discharge strainers installed in boiler fuel oil service systems to be \_\_\_\_\_.

- (a) as close to the fuel oil service manifold as practicable
- (b) enclosed in a drip-proof vented enclosure to reduce the possibility of fire
- (c) a positive venting system that will return any vapors to the pump suction
- (d) located so as to preclude the possibility of spraying oil on the burner or boiler casing

*If choice d is selected set score to 1.*

**286.** (3.7.13.4-2) Coast Guard Regulations (46 CFR Part 56) require that new fuel oil service piping between pumps and burners be subjected to \_\_\_\_\_.

- (a) spot radiographic examination of portions of the finished weld joints
- (b) a hydrostatic leak test to the design pressure specified by the Coast Guard
- (c) a hydrostatic test of 1.5 times the maximum allowable pressure but not less than 500 psi (3447 kPa)
- (d) a hydrostatic test of 1.25 times the maximum allowable pressure with the relief valves closed

*If choice c is selected set score to 1.*

**287.** (3.7.13.4-3) Coast Guard Regulations (46 CFR) require that quick-closing valves on a fuel oil service system should be installed as close as is practicable to the \_\_\_\_\_.

- (a) fuel oil settling tanks
- (b) boiler front fuel oil header
- (c) suction side of the fuel oil pump
- (d) fuel oil service heaters

*If choice b is selected set score to 1.*

**288.** (3.7.13.4-4) In accordance with Coast Guard Regulations (46 CFR) all fuel oil service piping in the vicinity of the burners must \_\_\_\_\_.

- (a) have wrap around deflectors on all bolted flanged joints
- (b) have all joints seal welded
- (c) utilize leak proof gaskets in all joints
- (d) be provided with coamings or drip pans

*If choice a is selected set score to 1.*



**289.** (3.7.13.4-5) Coast Guard Regulations (46 CFR) for boiler fuel oil service systems require \_\_\_\_\_.

- (a) fuel oil service tanks to overhang boilers to utilize heat radiated from the boilers for greater efficiency
- (b) machinery driving fuel oil service pumps to be fitted with remote controls so that they may be stopped in the event of a fire
- (c) fuel oil heaters for boilers burning fuels with low viscosity
- (d) all piping between service pumps and burner fronts to be located below the floor plates to eliminate fire hazards

*If choice b is selected set score to 1.*

**290.** (3.7.13.4-6) According to Coast Guard Regulations (46 CFR), which of the following is permitted in boiler fuel oil service system discharge piping?

- (a) Pipe unions one inch or greater in diameter.
- (b) Street ells made of carbon steel.
- (c) Bushings made of seamless steel.
- (d) Screwed bonnet valves of the union bonnet type.

*If choice d is selected set score to 1.*

**291.** (3.7.13.4-7) All oil-fired main propulsion burners with automatic safety control systems must automatically close the burner valve when \_\_\_\_\_.

- (a) the burner is properly seated
- (b) actuated by a boiler safety trip
- (c) starting "trial for ignition"
- (d) the flame in boiler furnace is confirmed

*If choice b is selected set score to 1.*

**292.** (3.7.13.5-1) Coast Guard Regulations (46 CFR) require that the design pressure of an economizer integral with the boiler and connected to the boiler drum without intervening stop valves shall be at least equal to \_\_\_\_\_.

- (a) 125% of the boiler hydrostatic test pressure
- (b) 150% of the boiler design test pressure
- (c) 110% of the drum safety valves highest set pressure
- (d) the feed pump shut off head pressure

*If choice c is selected set score to 1.*

**293.** (3.7.13.5-2) When a boiler economizer is fitted with a valved bypass, Coast Guard Regulations (46 CFR) require which of the following devices to be installed?

- (a) A stop check valve is to be located at the economizer outlet.
- (b) A sentinel valve is to be fitted on the superheater outlet.
- (c) A stop check valve is to be located at the economizer inlet.
- (d) An emergency drain line must be provided to the reserve feed tank.

*If choice a is selected set score to 1.*

**294.** (3.7.13.6-1) According to Coast Guard Regulations (46 CFR), feed water nozzles shall be fitted with sleeves, or have other suitable means employed to reduce the effects of temperature differentials on all boilers designed for operating pressures of \_\_\_\_\_.

- (a) 400 psig (2859 kPa) or over
- (b) 250 psig (1825 kPa) or over
- (c) 600 psig (4238 kPa) or over
- (d) 300 psig (2169 kPa) or over

*If choice a is selected set score to 1.*

**295.** (3.8.1.1.1-1) Journal bearings used with modern turbine rotors are manufactured in two halves in order to \_\_\_\_\_.

- (a) facilitate interchanging with other bearing halves
- (b) provide for positive oil flow at all loads
- (c) permit removal of the bearing without removing the rotor from the turbine
- (d) maintain axial alignment and reduce thrust

*If choice c is selected set score to 1.*

**296.** (3.8.1.1.1-2) The adjustable spherically seated self-aligning bearing housings used in main turbines are provided with oil deflector rings. The function of these rings is to \_\_\_\_\_.

- (a) prevent the external leakage of oil out of the bearing housing
- (b) prevent the leakage of main steam into the oil
- (c) direct the flow of oil through the bearing
- (d) ensure efficient lubrication of the bearing

*If choice a is selected set score to 1.*

**297.** (3.8.1.1.1-3) On a main propulsion turbine bearing, the readings obtained with a bridge gage represent the \_\_\_\_\_.

- ☐ (a) diaphragm tip clearance
- ☐ (b) Babbitt thickness
- ☒ (c) oil clearance and bearing wear
- ☐ (d) blade axial clearance

*If choice c is selected set score to 1.*

**298.** (3.8.1.1.1-4) Main steam turbine bearings are lined with \_\_\_\_\_.

- ☐ (a) ferrous oxide
- ☒ (b) Babbitt
- ☐ (c) steel
- ☐ (d) cast-iron

*If choice b is selected set score to 1.*

**299.** (3.8.1.1.1-5) For a large main propulsion turbine, the most commonly used turbine thrust bearing is the \_\_\_\_\_.

- ☐ (a) self-oiling sleeve
- ☐ (b) self-aligning shell
- ☒ (c) pivoted segmental shoe
- ☐ (d) overhung turbine wheel

*If choice c is selected set score to 1.*

**300.** (3.8.1.1.2-1) An efficient seal is normally obtained between the upper and lower halves of a turbine casing by \_\_\_\_\_.

- ☐ (a) copper gaskets
- ☒ (b) precision metal-to-metal contact
- ☐ (c) flexible steel seal strips
- ☐ (d) asbestos gaskets

*If choice b is selected set score to 1.*

**301.** (3.8.1.1.2-2) Turbine casing flanges are sometimes provided with a system of joint grooving to \_\_\_\_\_.

- ☒ (a) inject sealing compound between the casing halves
- ☐ (b) form a labyrinth seal between the casing halves
- ☐ (c) ensure perfect alignment of casing halves
- ☐ (d) increase contact pressure between the casing halves' flanges

*If choice a is selected set score to 1.*

**302.** (3.8.1.1.2-3) Allowance for axial expansion of the steam turbine due to temperature changes is provided for by the use of \_\_\_\_\_.

- ☐ (a) rotor position indicators
- ☒ (b) a deep flexible I beam support
- ☐ (c) casing flexible joints
- ☐ (d) pivoted-shoe type thrust bearings

*If choice b is selected set score to 1.*

**303.** (3.8.1.1.3-1) Which of the devices listed is found on an LP main propulsion steam turbine casing?

- ☐ (a) HP turbine bypass valve
- ☐ (b) Sliding beam
- ☒ (c) Sentinel valve
- ☐ (d) Duplex set of relief valves

*If choice c is selected set score to 1.*

**304.** (3.8.1.1.3-2) The purpose of the sentinel valve installed on a turbine casing is to \_\_\_\_\_.

- ☐ (a) vent excess steam to the main condenser
- ☒ (b) warn the engineer of excessive pressure in the low pressure turbine casing
- ☐ (c) relieve excess pressure to the turbine extraction points
- ☐ (d) warn the engineer of back flow of steam from the exhaust trunk

*If choice b is selected set score to 1.*

**305.** (3.8.1.1.4-2) Which of the following statements is true concerning the turbine shown in the illustration? Illustration SE-0016

- ☒ (a) A steam deflector is provided between the astern element and the ahead stages of the LP turbine.
- ☐ (b) The ahead rotor can be classified as a helical flow, Parsons type turbine
- ☐ (c) The astern element is of the Curtis type consisting of two three-row stages
- ☐ (d) The low pressure turbine is designed with reaction type stages

*If choice a is selected set score to 1.*

**306.** (3.8.1.1.4-1) The astern element of a main propulsion turbine is usually designed as a/an \_\_\_\_\_.

- ☒ (a) Curtiss stage, impulse turbine
- ☐ (b) single entry, double flow turbine
- ☐ (c) Parsons stage, reaction turbine
- ☐ (d) multiple entry, helical flow turbine

*If choice a is selected set score to 1.*

**307.** (3.8.1.1.5-1) Labyrinth seals used to reduce leakage around a turbine shaft are constructed of \_\_\_\_\_.

- (a) spring bound carbon segments
- (b) machined metallic packing strips or fins
- (c) staged rubber composition seal stripping
- (d) braided asbestos covered core segments

*If choice b is selected set score to 1.*

**308.** (3.8.1.1.5-2) When turbine rotor shafts extend through the casing, an external source of sealing steam is used in conjunction with labyrinth packing to \_\_\_\_\_.

- (a) seal the casing during periods of low casing pressure
- (b) maintain the rotor journal temperature
- (c) seal the casing during periods of high casing pressure
- (d) provide a constant flow to the gland leak off condenser

*If choice a is selected set score to 1.*

**309.** (3.8.1.1.5-3) The labyrinth seals used on rotating steam turbine shafts reduces external leakage by causing \_\_\_\_\_.

- (a) increased turbulence through successively larger labyrinth clearances
- (b) successive pressure drops through the seal stages
- (c) successive temperature drops through the seal stages
- (d) pressure increases through successive seal stages

*If choice b is selected set score to 1.*

**310.** (3.8.1.1.5-4) Labyrinth packing rings are installed on turbine diaphragms to minimize \_\_\_\_\_.

- (a) steam from escaping to the atmosphere
- (b) pressure buildup on both sides of the diaphragm
- (c) air leakage from entering the turbine casing
- (d) interstage steam leakage along the turbine rotor

*If choice d is selected set score to 1.*

**311.** (3.8.1.1.5-5) Where are moisture shields located in a main propulsion steam turbine?

- (a) Around throttle valve stems
- (b) At the inner stage diaphragms
- (c) At the steam strainer inlet
- (d) After the last stage of the ahead rotor blading

*If choice d is selected set score to 1.*

**312.** (3.8.1.1.6-1) The jacking/turning gear mechanism of a main propulsion geared turbine installation is normally connected through mechanical linkage to the \_\_\_\_\_.

- ☐ (a) bull gear
- ☐ (b) low speed gear rotor
- ☒ (c) high speed pinion rotor
- ☐ (d) low speed pinion rotor

*If choice c is selected set score to 1.*

**313.** (3.8.1.1.6-2) The jacking gear on main propulsion turbines can be used to \_\_\_\_\_.

- ☒ (a) provide reduction gear tooth inspection
- ☐ (b) provide propulsion in emergencies
- ☐ (c) reduce turbine speed during maneuvering
- ☐ (d) lift the reduction gear casing

*If choice a is selected set score to 1.*

**314.** (3.8.1.1.6-3) The main propulsion shaft turning gear usually connects to the free end of the high-speed high pressure pinion because the \_\_\_\_\_.

- ☒ (a) greatest gear ratio between the turning gear motor output and bull gear can be obtained
- ☐ (b) turning gears are double reduction worm type and cannot mate with the low pressure high-speed pinion
- ☐ (c) lubricating oil from the high-speed pinion can easily supply the turning gears
- ☐ (d) arrangement allows for the use of a muff type coupling for flexibility and smooth engagement

*If choice a is selected set score to 1.*

**315.** (3.8.1.1.6-4) Which of the devices listed is generally used to engage the main engine turning gear to the high pressure turbine high-speed pinion?

- ☐ (a) Manually operated band brake
- ☐ (b) Quill shaft
- ☐ (c) Sleeve coupling
- ☒ (d) Manually operated sliding jaw clutch

*If choice d is selected set score to 1.*

**316.** (3.8.1.1.7-1) Before placing the jacking gear in operation on a main turbine unit, you must always insure that \_\_\_\_\_.

- ☐ (a) the condensate system is operating
- ☒ (b) the main lube oil system is operating
- ☐ (c) the gland seal steam system is operating
- ☐ (d) the main salt water circulating pump is operating

*If choice b is selected set score to 1.*

**317.** (3.8.1.1.7-2) Prior to rolling the main turbines in preparation for getting underway, you should \_\_\_\_\_.

- (a) circulate the lube oil through the emergency lube oil cooler
- (b) secure the gland sealing steam regulator
- (c) open the reduction gear casing access plates and inspect the lube oil spray pattern
- (d) disengage the turning gear

*If choice d is selected set score to 1.*

**318.** (3.8.1.1.7-3) After properly lining up the main propulsion turbine for warm up, steam should first be admitted to the rotor through the \_\_\_\_\_.

- (a) HP turbine bleed valve
- (b) ahead throttle valve
- (c) LP turbine bleed valve
- (d) astern throttle valve

*If choice d is selected set score to 1.*

**319.** (3.8.1.1.7-4) When a turbine rotor is not rotating during maneuvering, the heat tends to be concentrated at the \_\_\_\_\_.

- (a) turbine bleed lines
- (b) exhaust trunk
- (c) top of the turbine
- (d) casing joints

*If choice c is selected set score to 1.*

**320.** (3.8.1.1.7-5) With vacuum up and the main propulsion turbine standing by while awaiting engine orders, it is necessary to roll the unit alternately ahead and astern every five minutes to \_\_\_\_\_.

- (a) reduce the possibility of warping the turbine rotors
- (b) warm the astern guarding valve and the low lube oil pressure throttle trip
- (c) slowly bring the lube oil and bearings to operating temperature
- (d) distribute the gland sealing steam evenly throughout the glands

*If choice a is selected set score to 1.*

**321.** (3.8.1.1.7-6) To stop the rotor of a main turbine while underway at sea you should \_\_\_\_\_.

- (a) apply the prony brake
- (b) tighten the stern tube packing gland
- (c) secure all steam to the turbine
- (d) admit astern steam to the turbine after securing the ahead steam

*If choice d is selected set score to 1.*

**322.** (3.8.1.1.7-7) To prevent damage to the turning gear mechanism, which of the following procedures must be carried out before the turning gear is engaged?

- (a) The propeller shaft must be stopped and held stationary until the clutch is engaged.
- (b) The engine order telegraph must be on 'stop'.
- (c) The brake on the first reduction worm shaft must be set.
- (d) The speed of the astern turbine must be reduced.

*If choice a is selected set score to 1.*

(3.8.1.1.7-8) In securing the main turbines, steam to the second stage air ejectors should be left on for a short period of time in order to \_\_\_\_\_.

- (a) prevent excessive condensate depression
- (b) insure equal cooling of the main turbine bearings
- (c) remove the excessive amount of non-condensable vapors which accumulated during maneuvering operations
- (d) dry out the main turbines

*If choice d is selected set score to 1.*

**323.** (3.8.1.3-1) A common cause of the Babbitt linings cracking in a turbine journal bearing is from \_\_\_\_\_.

- (a) prolonged operation at low speed
- (b) prolonged operation at full speed
- (c) excessive thrust bearing wear
- (d) vibration generated by the rotor

*If choice d is selected set score to 1.*

**324.** (3.8.1.3-2) If steam is admitted to the main propulsion turbine with the jacking gear engaged, which of the following problems can occur?

- (a) Destruction of the jacking gear.
- (b) Excessive tooth stress on the high pressure first reduction pinion.
- (c) A possibility of shearing the jacking gear flexible coupling.
- (d) Uneven warming of the turbine.

*If choice a is selected set score to 1.*

**325.** (3.8.1.3-3) Excessive thrust bearing wear in a main propulsion turbine rotor should FIRST become apparent by \_\_\_\_\_.

- (a) taking rotor position indicator readings
- (b) metal particles in the lube oil purifier
- (c) rubbing noises when jacking over the main unit
- (d) an intermittent vibration when changing speed

*If choice a is selected set score to 1.*



**326.** (3.8.1.3-4) Raising vacuum on a main turbine unit without using the turning gear will result in \_\_\_\_\_.

- ☐ (a) excessive time being required to raise vacuum
- ☒ (b) uneven heat distribution in the rotor unit
- ☐ (c) scoring of the rotor in way of the labyrinth packing
- ☐ (d) overheating of the second-stage air ejector

*If choice b is selected set score to 1.*

**327.** (3.8.1.3-5) The original bridge gage reading for a reduction gear bearing was measured as .008 inches. A year later, the bridge gage reading for the same bearing is .010 inches. This indicates \_\_\_\_\_.

- ☐ (a) oil clearance is .002 inch
- ☐ (b) bearing wear is .010 inch
- ☒ (c) bearing wear is .002 inch
- ☐ (d) oil clearance has increased .010 inch

*If choice c is selected set score to 1.*

**328.** (3.8.1.3-6) If the main propulsion turbine begins to vibrate severely while you are increasing speed, you should \_\_\_\_\_.

- ☐ (a) stop the turbine and not answer any more bells
- ☐ (b) open the throttle wider to pass through the critical speed
- ☐ (c) hold the turbine at that speed until vibration stops
- ☒ (d) immediately slow the turbine to see if the vibration will stop

*If choice d is selected set score to 1.*

**329.** (3.8.1.3-7) The main propulsion turbine can be damaged by \_\_\_\_\_.

- ☐ (a) maintaining vacuum too high
- ☒ (b) water carryover from the boilers
- ☐ (c) operating at slow speeds
- ☐ (d) using the jacking gear when there is no vacuum

*If choice b is selected set score to 1.*

**330.** (3.8.1.3-8) An unusual vibration in the main propulsion turbine unit, accompanied by a rumbling sound in the reduction gear, could be caused by \_\_\_\_\_.

- ☐ (a) a labyrinth seal failure
- ☒ (b) a carryover from the boiler
- ☐ (c) overloading of the condenser
- ☐ (d) a reduction in condenser vacuum

*If choice b is selected set score to 1.*

**331.** (3.8.1.3-9) An overheated bearing in the main propulsion unit is indicated by \_\_\_\_\_.

- (a) high temperature of the lube oil leaving the bearing
- (b) bubbles in the sight flow glasses
- (c) high level in the lube oil sump
- (d) sludge in the lube oil strainers

*If choice a is selected set score to 1.*

**332.** (3.8.1.3-10) When a turbine bearing shows signs of overheating, you should \_\_\_\_\_.

- (a) increase the lube oil pump discharge pressure
- (b) stop the turbine
- (c) immediately reduce speed
- (d) increase the cooling water supply to the lube oil cooler

*If choice c is selected set score to 1.*

**333.** (3.8.2.1-1) The turbine of a turbo-electric drive should be secured by \_\_\_\_\_.

- (a) dynamic braking of the generator
- (b) closing the throttle by hand
- (c) tripping the throttle trip by hand
- (d) closing the main steam stops

*If choice c is selected set score to 1.*

**334.** (3.8.2.1-2) An auxiliary turbine boiler feed pump should normally be stopped by \_\_\_\_\_.

- (a) closing the exhaust valve slightly
- (b) rotating the hand lube oil pump backwards
- (c) actuating the throttle hand tripping device
- (d) increasing the load on the driven unit

*If choice c is selected set score to 1.*

**335.** (3.8.2.1-3) The over speed tripping device installed on an auxiliary turbine is automatically actuated by \_\_\_\_\_.

- (a) centrifugal force
- (b) high back pressure
- (c) hydraulic pressure
- (d) pneumatic force

*If choice a is selected set score to 1.*

**336.** (3.8.2.1-4) Most auxiliary turbine feed pumps do not require an external source of gland sealing steam because they \_\_\_\_\_.

- ☐ (a) operate with only a small amount of axial thrust
- ☐ (b) operate at relatively low pressures
- ☐ (c) utilize carbon packing rings at the low pressure end
- ☒ (d) exhaust to pressures above atmospheric pressure

*If choice d is selected set score to 1.*

**337.** (3.8.2.1-5) Packing rings installed on auxiliary turbines are generally lubricated by \_\_\_\_\_.

- ☒ (a) moisture in the turbine steam
- ☐ (b) separate lube oil lines
- ☐ (c) a salt water service line
- ☐ (d) a water leak off line

*If choice a is selected set score to 1.*

**338.** (3.8.3.1.1-1) Which of the following statements describes how the main propulsion turbine over speed relay initiates closing of the throttle valve?

- ☐ (a) Excessive centrifugal force causes spring loaded fly balls to actuate a control lever.
- ☐ (b) Excessive speed causes an increase in lube oil control temperature which actuates a solenoid oil dump valve.
- ☒ (c) Excessive speed causes an oil pump to develop sufficient pressure to open a spring loaded relay valve which tends to close the steam control valve.
- ☐ (d) Excessive centrifugal force causes a spring loaded weight to trip a valve latch.

*If choice c is selected set score to 1.*

**339.** (3.8.3.1.2.1-1) When starting a turbo generator, you must provide lube oil pressure to the governor power piston by means of \_\_\_\_\_.

- ☐ (a) a line from the other generator
- ☐ (b) a line from the gravity tank
- ☒ (c) the hand operated or auxiliary lube oil pump
- ☐ (d) the main lube oil pump

*If choice c is selected set score to 1.*

**340.** (3.8.3.1.2.1-2) A back pressure trip on a ship's service turbo-generator functions to trip the turbine under what circumstance?

- ☐ (a) amount of cooling water to the condenser is excessive
- ☒ (b) amount of cooling water to the condenser is insufficient
- ☐ (c) lubricating oil pressure is too low
- ☐ (d) gland seal leak off pressure is too high

*If choice b is selected set score to 1.*

**341.** (3.8.3.1.2.1-3) A pilot valve and servomotor are utilized in mechanical-hydraulic governing systems on a turbo generator unit in order to \_\_\_\_\_.

- ☐ (a) provide a means of maintaining constant output voltage
- ☐ (b) allow parallel operation with zero speed droop
- ☐ (c) constant load on the turbine unit
- ☒ (d) provide sufficient force to operate large steam lifting beam control valves

*If choice d is selected set score to 1.*

**342.** (3.8.3.1.2.1-4) Which of the listed parts illustrated in the turbo generator governing system, provides the follow-up to prevent the nozzle valves from cycling between the fully open and fully closed positions, with each variation in turbine speed? Illustration SE-0009

- ☐ (a) H
- ☐ (b) O
- ☒ (c) E
- ☐ (d) D

*If choice c is selected set score to 1.*

**343.** (3.8.3.1.2.1-5) Which of the listed actions will occur when there is an increase in load on a ship service generator equipped with a centrifugal type hydraulic governor? Illustration SE-0009

- ☐ (a) The governor weights move outward.
- ☒ (b) More oil will enter the operating cylinder (O).
- ☐ (c) Steam flow to the turbine decreases.
- ☐ (d) The operating piston is forced to move lower.

*If choice b is selected set score to 1.*

**344.** (3.8.3.1.2.2-1) The over speed tripping device installed on an auxiliary turbine is automatically actuated by \_\_\_\_\_.

- (a) centrifugal force
- (b) pneumatic force
- (c) high back pressure
- (d) hydraulic pressure

*If choice a is selected set score to 1.*

**345.** (3.8.3.1.2.2-2) An excess pressure governor would normally be used on a \_\_\_\_\_.

- (a) low pressure propulsion turbine
- (b) turbine-driven feed pump
- (c) forced draft fan
- (d) main circulator pump

*If choice b is selected set score to 1.*

**346.** (3.8.3.1.2.2-3) The constant pressure governor of a turbine-driven feed pump maintains which of the following pressures at a constant value for all capacities?

- (a) Pump discharge
- (b) Turbine inlet
- (c) Turbine exhaust
- (d) Pump suction

*If choice a is selected set score to 1.*

**347.** (3.8.4.1.1-1) A sequential lift, nozzle valve control bar on a turbo generator, utilizes which of the following operating principles?

- (a) A lifting beam mechanism engages nozzle valve stems of varying lengths.
- (b) A servomotor, mechanically connected to nozzle valve hand wheels, opens or closes the valves in accordance with the type of electrical signal received.
- (c) A hydraulic piston raises or lowers groups of valves according to pressure received from a governor.
- (d) A hydraulic piston raises or lowers individual valves according to pressure received from a governor.

*If choice a is selected set score to 1.*

**348.** (3.8.4.1.1-2) Which of the following statements represents the significance of the differential pressure existing between the nozzle block and steam chest of a turbo generator equipped with a lifting beam mechanism?

- ☐ (a) The pressure differential necessitates the use of a special balance piston.
- ☐ (b) The pressure differential requires the installation of a special biasing spring to open the valves.
- ☒ (c) The pressure differential assists in seating the valves when the lifting beam is lowered.
- ☐ (d) The pressure differential eliminates the possibility of valve binding in the lifting beam.

*If choice c is selected set score to 1.*

**349.** (3.8.4.1.1-3) Which of the following is used to hold the poppet valves closed in a turbo generators nozzle control speed regulator?

- ☐ (a) Springs
- ☒ (b) Steam pressure
- ☐ (c) Lifting beam
- ☐ (d) Oil pressure

*If choice b is selected set score to 1.*

**350.** (3.8.4.1.1-4) A motor driven synchronizing device, figure "D" shown in the illustration, operated from the generator switchboard, initiates fine adjustments to the steam turbine speed by directly \_\_\_\_\_. Illustration SE-0009

- ☐ (a) varying the pivot rod stroke length on the governor weight eccentric pad
- ☐ (b) increasing or decreasing operating spring pressure
- ☒ (c) changing the vertical location of the pilot valve bushing
- ☐ (d) raising or lowering the nozzle block lifting beam

*If choice c is selected set score to 1.*

**351.** (3.8.6.1.1-1) One function of the disks, in a disk-type centrifugal purifier, is to divide the bowl space into many separate passages to \_\_\_\_\_.

- ☐ (a) increase hydraulic head needed for proper circulation
- ☐ (b) completely filter out suspended particles
- ☐ (c) prevent bowl spindle vibration
- ☒ (d) minimize agitation of the oil-water mixture

*If choice d is selected set score to 1.*

**352.** (3.8.6.1.1-2) The size of the discharge ring used for the efficient operation of a disk type purifier is dependent upon the \_\_\_\_\_.

- ☐ (a) maximum design speed of that purifier
- ☐ (b) rated capacity of that purifier
- ☒ (c) specific gravity of the oil being purified
- ☐ (d) viscosity of the oil being purified

*If choice c is selected set score to 1.*

**353.** (3.8.6.1.1-3) In a disk type centrifugal purifier, the contaminated oil enters the centrifuge \_\_\_\_\_.

- ☐ (a) at the bottom through the oil inlet
- ☐ (b) through the funnel body
- ☒ (c) at the top through the regulating tube
- ☐ (d) through the neck of the top disk

*If choice c is selected set score to 1.*

**354.** (3.8.6.1.1-4) Clean oil leaves the centrifuge illustrated through item \_\_\_\_\_. Illustration GS-0124

- ☐ (a) K
- ☐ (b) N
- ☐ (c) V
- ☒ (d) X

*If choice d is selected set score to 1.*

**355.** (3.8.6.1.1-5) Water removed through centrifugal force in the illustrated unit is displaced from the bowl through \_\_\_\_\_. Illustration GS-0124

- ☐ (a) X
- ☐ (b) K
- ☒ (c) N
- ☐ (d) V

*If choice c is selected set score to 1.*

**356.** (3.8.6.1.1-6) The three wing device in the unit illustrated is maintained in its position by item \_\_\_\_\_. Illustration GS-0124

- ☐ (a) O
- ☒ (b) Q
- ☐ (c) R
- ☐ (d) P

*If choice b is selected set score to 1.*

**357.** (3.8.6.1.2-1) Oil supply pressure to the main lube oil header of a gravity feed lube oil system is \_\_\_\_\_.

- (a) the sum of the lube oil static head pressure and service pump discharge pressure
- (b) the result of the height of the gravity tank above the manifold
- (c) the difference between the lube oil static head pressure and service pump discharge pressure
- (d) equal to the service pump discharge pressure, since the static heads of the lines to and from the gravity tank cancel out one another

*If choice b is selected set score to 1.*

**358.** (3.8.6.1.2-2) Which of the following statements is true concerning the lube oil system shown in the illustration? Illustration SE-0011

- (a) The drains from lube oil coolers can be directed back to the main sump, the sludge tank or the lube oil purifier.
- (b) The gravity tank overflow line leads directly to the lube oil sludge tank.
- (c) The gravity tank directly provides the normal supply of oil to the turbines and gears.
- (d) The three-way temperature control valve bypasses cooling water around or through the lubricating oil cooler to maintain the desired oil temperature.

*If choice a is selected set score to 1.*

**359.** (3.8.6.1.2-3) Which of the following statements about gravity type lube oil systems is correct?

- (a) Any lube oil pump failure causes immediate damage to turbine bearings.
- (b) Gravity tanks are fitted with an overflow alarm.
- (c) The discharge from the gravity tanks flows to the lube oil pump suction.
- (d) Gravity tank overflow lines are lead directly to the lube oil sump.

*If choice d is selected set score to 1.*

**360.** (3.8.6.1.2-4) After starting the main lube oil pump in a gravity-type lube oil system, you should verify that the gravity tanks are full by \_\_\_\_\_.

- (a) sounding the gravity tanks
- (b) observing the flow from the bearings
- (c) sounding the lube oil sump
- (d) observing the overflow sight glass

*If choice d is selected set score to 1.*

**361.** (3.8.6.1.2-5) In a steam turbine and reduction gear main propulsion plant, the alarm sensor for low turbine oil pressure is usually installed \_\_\_\_\_.

- (a) at a point on the outlet side of the main bearings as close to the bearings as possible
- (b) at the end of the supply line header to the bearings
- (c) at the outlet of the main thrust bearing
- (d) at a point on the inlet side of the main bearings as close to the bearings as possible

*If choice b is selected set score to 1.*



**362.** The maximum lube oil temperature leaving the lube oil cooler of a main steam turbine propulsion system should \_\_\_\_\_.

- ☐ (a) be dictated only by the existing sea water temperature
- ☐ (b) be about 180°F
- ☒ (c) never exceed 130°F
- ☐ (d) never be more than 60°F below the lube oil inlet temperature

*If choice c is selected set score to 1.*

**363.** The maximum lube oil temperature leaving a large, main propulsion steam turbine bearing should \_\_\_\_\_.

- ☒ (a) never exceed 170°F
- ☐ (b) be always maintained at 130° F
- ☐ (c) never exceed the inlet temperature by more than 70°F
- ☐ (d) not exceed the normal lube oil outlet temperature from the centrifugal purifier

*If choice a is selected set score to 1.*

**364.** (3.8.6.3.1-1) When the flow of oil admitted to a disk-type centrifugal purifier is in excess of its designed capacity, which of the following conditions will usually occur?

- ☐ (a) The speed of the centrifuge will increase.
- ☒ (b) The oil will discharged through the heavy phase discharge port.
- ☐ (c) Oil will be present in the water sealing line to the bowl.
- ☐ (d) All water will be retained by the purified oil being discharge.

*If choice b is selected set score to 1.*

**365.** (3.8.6.3.1-2) When an oil purification centrifuge loses a portion of its seal, the oil can then be discharged through the heavy phase discharge port. This is partly a result of greater \_\_\_\_\_.

- ☒ (a) centrifugal force being developed on the oil near the interface
- ☐ (b) centrifugal force being developed on the water seal at the side of the bowl
- ☐ (c) centripetal force being developed on the oil near the interface
- ☐ (d) centripetal force being developed on the water seal at the side of the bowl

*If choice a is selected set score to 1.*

**366.** (3.8.6.3.1-3) In the illustrated device, what would be a reason for oil being discharged from port "N" ? Illustration GS-0124

- ☐ (a) This would be normal for the operation.
- ☐ (b) The device being operated as a clarifier.
- ☐ (c) The ring dam size is too small.
- ☒ (d) The ring dam size is too large.

*If choice d is selected set score to 1.*

**367.** (3.8.6.3.1-4) Which of the following problems will occur if a manually cleaned disk-type centrifugal lube oil purifier contains insufficient sealing water prior to admitting oil flow to the bowl?

- (a) Lube oil will discharge from the heavy phase discharge port to the sludge tank.
- (b) The lube oil will overheat and flash.
- (c) Contamination of the lube oil by emulsification will result.
- (d) The lube oil will not be subjected to the proper centrifugal force.

*If choice a is selected set score to 1.*

**368.** (3.8.6.3.2-1) If a lube oil pump fails to build up discharge pressure, the cause could be the \_\_\_\_\_.

- (a) discharge valve is open
- (b) suction vacuum is high
- (c) bypass valve is closed
- (d) suction valve is closed

*If choice d is selected set score to 1.*

**369.** (3.8.6.3.2-2) If a tube should leak in an operating main steam turbine lube oil cooler, the water will not immediately contaminate the oil because the \_\_\_\_\_.

- (a) second-stage discharge valve will open
- (b) plug type bypass valve will open
- (c) oil pressure is greater than the water pressure
- (d) cooling pump would automatically shut off

*If choice c is selected set score to 1.*

**370.** (3.8.6.3.2-3) While a vessel is underway, which of the conditions listed would indicate a leak in the lube oil cooler?

- (a) Excessive lube oil consumption.
- (b) Corrosion of the journals and bearings.
- (c) Contamination of the lube oil.
- (d) Excessive water discharge rate from the lube oil purifier.

*If choice a is selected set score to 1.*

**371.** (3.8.6.3.2-4) While making your rounds, you notice the main lube oil temperature to be higher than normal. To remedy this situation, you should \_\_\_\_\_.

- (a) open the lube oil cooler seawater inlet valve wider
- (b) increase the opening of the lube oil cooler seawater discharge valve
- (c) speed up the main lube oil pump
- (d) throttle in on the lube oil cooler seawater discharge valve

*If choice b is selected set score to 1.*

**372.** (3.8.6.3.2-5) No lube oil appearing in the sight glass (bull's eye) of a gravity type system is a positive indication of \_\_\_\_\_.

- ☐ (a) failure of all lube oil pumps
- ☒ (b) no oil is overflowing the gravity tank
- ☐ (c) no oil flowing to the bearings
- ☐ (d) the gravity tanks being empty

*If choice b is selected set score to 1.*

**373.** (3.8.6.3.2-7) Which of the conditions listed could cause an oil flow sight glass, of a main turbine bearing, to be completely filled with oil?

- ☒ (a) A restriction in the oil drain line to the sump.
- ☐ (b) Excessive air trapped in the lube oil system.
- ☐ (c) An increase in oil temperature.
- ☐ (d) Increasing the amount of oil through the gravity tank overflow line.

*If choice a is selected set score to 1.*

**374.** (3.8.6.3.2-7) When a sudden increase in pressure occurs in a forced lubrication system, you should check for a \_\_\_\_\_.

- ☐ (a) high lube oil sump level
- ☐ (b) clogged lube oil pump suction
- ☒ (c) loss of oil flow across one of the bearings
- ☐ (d) ruptured tube in the lube oil cooler

*If choice c is selected set score to 1.*

**375.** (3.8.6.3.3-1) To determine the extent of lube oil system contamination you would \_\_\_\_\_.

- ☐ (a) observe the oil flow in the sight glasses
- ☒ (b) inspect the purifier for separated foreign matter
- ☐ (c) maintain a close watch on bearing temperatures
- ☐ (d) watch for variations in the lube oil pump discharge pressure

*If choice b is selected set score to 1.*

**376.** (3.8.6.3.3-2) Water retained in the lube oil system of a main propulsion turbine installation is undesirable because it \_\_\_\_\_.

- ☐ (a) causes the turbine to over speed
- ☒ (b) causes pitting of the gear teeth
- ☐ (c) raises the flash point of the oil to a dangerously high level
- ☐ (d) results in excessive cooling of bearing surfaces

*If choice b is selected set score to 1.*

**377.** (3.8.6.3.3-3) A cloudy or milky appearing lube oil sample, taken from the main lubricating oil system could be caused by \_\_\_\_\_.

- (a) excessive gland sealing steam
- (b) excessive cooling water to the lube oil cooler
- (c) insufficient cooling water to the lube oil cooler
- (d) insufficient gland sealing steam

*If choice a is selected set score to 1.*

**378.** (3.8.6.3.3-4) Which of the following would contribute to the formation of an oil and water emulsion, in addition to acid formation?

- (a) Aeration, agitation, and heat
- (b) Solid insoluble particles, aeration, and heat
- (c) Water, agitation, and heat
- (d) Water and solid insoluble particles

*If choice c is selected set score to 1.*

**379.** (3.8.6.3.3-5) Which of the following conditions may exist if you detect an excessive amount of metal particles on a main engine lube oil strainer magnet?

- (a) Reduction gear damage.
- (b) Main shaft bearing damage.
- (c) Journal bearing damage.
- (d) Turbine shrouding damage.

*If choice a is selected set score to 1.*

**380.** (3.8.7.1.1-1) Which of the following types of bearings are used as line shaft bearings?

- (a) tapered roller, split type radial
- (b) Rigidly mounted, radial sleeve
- (c) Ring-oiled, Babbitt-faced, spherical seat, shell
- (d) Segmental, pivoted-shoe thrust

*If choice c is selected set score to 1.*

**381.** (3.8.7.1.1-2) Babbitt is a metal alloy commonly used for lining \_\_\_\_\_.

- (a) precision bearings
- (b) saltwater piping
- (c) valve seats
- (d) shim stock

*If choice a is selected set score to 1.*

**382.** (3.8.7.1.1-3) The splits located in the halves of main reduction gear bearings are aligned at an angle to the horizontal in order to resist \_\_\_\_\_.

- (a) wiping
- (b) steam loss
- (c) oil loss
- (d) axial stress

*If choice a is selected set score to 1.*

**383.** (3.8.7.1.1-4) Most main propulsion reduction gear bearings are \_\_\_\_\_.

- (a) self-aligning, solid bushings
- (b) rigidly mounted, Babbitt lined, split type
- (c) spherical-seated, tapered roller type
- (d) self-lubricating, sealed, roller ball type

*If choice b is selected set score to 1.*

**384.** (3.8.7.1.2-1) Which of the devices listed is commonly used to compensate for the expansion and minor misalignments occurring between the main turbine rotor and the reduction gear?

- (a) Expansion gear
- (b) Gear type flexible coupling
- (c) Quill shaft
- (d) Sliding sleeve

*If choice b is selected set score to 1.*

**385.** (3.8.7.1.2-2) Which of the following statements is true concerning the coupling shown in the illustration? Illustration SE-0001

- (a) It can be used to connect the main turbine to the high-speed pinion.
- (b) It is commonly used between the first reduction pinion and the second reduction gear.
- (c) It is suitable for use on small auxiliary turbines only.
- (d) It allows for any misalignment between the main turbine and the second reduction gear.

*If choice a is selected set score to 1.*

**386.** (3.8.7.1.2-3) The part shown in the illustration would be located between which of the following components of a modern geared turbine main propulsion unit? Illustration SE-0001

- (a) Between the bull gear and line shaft on the thrust bearing side of the gear.
- (b) Between the first reduction gears and high-speed pinions of the high pressure and low pressure turbines.
- (c) Between the bull gear and line shaft on the side of the gear opposite the thrust bearing.
- (d) Between the rotors and high-speed pinions of the high pressure and low pressure turbines.

*If choice d is selected set score to 1.*

**387.** (3.8.7.1.3-1) The purpose of the main reduction gears is to \_\_\_\_\_.

- ☐ (a) provide a means of reversing the main engines in an emergency
- ☐ (b) transmit vibration and thrust to the ship's hull
- ☒ (c) reduce high turbine RPM to an efficient propeller RPM
- ☐ (d) reduce engine room noise levels during high speed operations

*If choice c is selected set score to 1.*

**388.** (3.8.7.1.3-2) What is the significance of pinion deflection in the operation of reduction gears?

- ☒ (a) Pinion deflection causes unequal tooth loading.
- ☐ (b) Deflection is minimal because a longer pinion is more rigid.
- ☐ (c) Deflection causes excessive wear at the center of the pinion.
- ☐ (d) Deflection causes excessive wear at both ends of the pinion.

*If choice a is selected set score to 1.*

**389.** (3.8.7.1.3-3) The component labeled "II", as shown in the illustration, is called the \_\_\_\_\_.  
Illustration SE-0013

- ☐ (a) first reduction gear
- ☐ (b) second reduction pinion
- ☐ (c) second reduction gear
- ☒ (d) high speed pinion

*If choice d is selected set score to 1.*

**390.** (3.8.7.1.3-4) The reduction gear shown in the illustration is a/an \_\_\_\_\_. Illustration SE-0013

- ☐ (a) locked-train double reduction gear
- ☒ (b) articulated double reduction gear
- ☐ (c) nested double reduction gear
- ☐ (d) nested four-step reduction gear

*If choice b is selected set score to 1.*

**391.** (3.8.7.1.3-5) Regarding main reduction gears, when high speed first reduction pinions and gears are connected to low speed pinions and gears, each contained in a sequential portion of the gear housing, the reduction gear unit is known as \_\_\_\_\_.

- ☒ (a) articulated
- ☐ (b) locked train
- ☐ (c) nested
- ☐ (d) none of the above

*If choice a is selected set score to 1.*

**392.** (3.8.7.1.4-1) As found in a reduction gear drive system, thrust bearings serve to \_\_\_\_\_.

- (a) transmit the force produced by the propeller to the structure of the ship
- (b) hold the main engine in place
- (c) increase the shaft speed
- (d) limit the radial movement of the shaft

*If choice a is selected set score to 1.*

**393.** (3.8.7.1.4-2) In the thrust bearing assembly illustrated the total oil clearance can be correctly decreased by \_\_\_\_\_. Illustration SE-0007

- (a) decreasing the thickness of the adjusting ring
- (b) increasing the thickness of the adjusting ring
- (c) increasing the thickness of the filler piece
- (d) decreasing the thickness of the filler piece

*If choice a is selected set score to 1.*

**394.** (3.8.7.1.4-3) In the diagrammatic arrangement of the thrust bearing, shown in the illustration, the direction of shaft rotation and the direction of thrust are indicated respectively by arrows \_\_\_\_\_. Illustration SE-0012

- (a) G and J
- (b) F and J
- (c) F and H
- (d) G and H

*If choice b is selected set score to 1.*

**395.** (3.8.7.1.4-5) A Kingsbury, or pivot shoe type thrust bearing, can bear much greater loads per square inch of working surface than can parallel surface bearings because provisions are made in the Kingsbury bearing \_\_\_\_\_.

- (a) to allow the leveling plates to pivot on the collar when thrust loads are applied
- (b) for adjusting the filler piece thickness behind the pivotal-shoes to give a more accurate fit
- (c) for the shoes to tilt slightly, thereby allowing the formation of a wedge shaped oil film under a thrust load
- (d) for automatically adjusting clearances to the correct value when wear occurs

*If choice c is selected set score to 1.*

**396.** (3.8.7.1.4-4) The base ring shown in the illustration is identified by the letter \_\_\_\_\_.  
Illustration SE-0012

- ☐ (a) E
- ☒ (b) D
- ☐ (c) A
- ☐ (d) C

*If choice b is selected set score to 1.*

**397.** (3.8.7.15-1) Which of the statements listed applies to the quill shaft shown in the illustration?  
Illustration SE-0005

- ☐ (a) It provides torsional rigidity to help maintain alignment between gear train and the turbine rotor.
- ☐ (b) It absorbs the axial thrust generated by the meshing gears.
- ☒ (c) It permits axial movement between the high speed gear and low speed pinion.
- ☐ (d) It compensates for high speed pinion radial misalignment.

*If choice c is selected set score to 1.*

**398.** (3.8.7.1.6-1) Which of the following operational practices is helpful in avoiding the accumulation of condensate in the main reduction gear casing?

- ☐ (a) The temperature of the lubricating oil should not exceed the gear manufacturer's recommendation when the unit is operating at full load.
- ☒ (b) After the main unit is secured, lubricating oil should be circulated until the temperature of the oil and reduction gear casing approximates the engine room temperature.
- ☐ (c) Avoid applying gland sealing steam to the low pressure turbine until you are ready to start up the first-stage air ejector.
- ☐ (d) Always ensure that the lubricating oil pressure is 14-17 psi when operating in unusually cold waters.

*If choice b is selected set score to 1.*

**399.** The most practical method of determining the condition of a shaft bearing while the shaft is in operation is to \_\_\_\_\_.

- ☐ (a) visually inspect the bearing
- ☒ (b) check the lube oil temperature
- ☐ (c) check the lube oil viscosity
- ☐ (d) perform a carbon blot test on an oil sample from the bearing

*If choice b is selected set score to 1.*



**400.** Which of the listed operational checks should be made "continuously" on the main propulsion reduction gears?

- ☐ (a) Check radial bearing wear.
- ☒ (b) Check bearing lube oil temperatures.
- ☐ (c) Inspect alignment between gears and turbine.
- ☐ (d) Check teeth for pitting and scuffing.

*If choice b is selected set score to 1.*

**401.** (3.8.7.3-1) Which immediate action should you take when the temperature of one line shaft bearing increases above its normal operating temperature?

- ☐ (a) Stop the unit and replace the bearing.
- ☒ (b) Check the bearing for proper lubrication.
- ☐ (c) Stop the unit and carefully inspect the bearing.
- ☐ (d) Check for proper water circulation to the lube oil coolers.

*If choice b is selected set score to 1.*

**402.** (3.8.7.3-2) The most practical method of determining the condition of a shaft bearing while the shaft is in operation is to \_\_\_\_\_.

- ☐ (a) perform a carbon blot test on an oil sample from the bearing
- ☒ (b) check the lube oil temperature
- ☐ (c) check the lube oil viscosity
- ☐ (d) visually inspect the bearing

*If choice b is selected set score to 1.*

**403.** (3.8.7.3-3) Which of the following would cause the dowel or locking lip of a split-type, precision insert, main bearing to shear and allow the bearing to rotate with the journal?

- ☐ (a) Unequal torque to any two adjacent bearing bolts
- ☐ (b) Short periods of above normal operating speeds
- ☒ (c) Insufficient bearing crush
- ☐ (d) Excessive bearing bolt torque

*If choice c is selected set score to 1.*

**404.** (3.8.7.3-4) If a line shaft bearing begins to overheat, the shaft speed should be reduced. If overheating persists, you should then \_\_\_\_\_.

- ☒ (a) apply emergency cooling water externally to the bearing
- ☐ (b) increase lube oil pressure to the bearing
- ☐ (c) flood the bearing with a higher viscosity oil to provide emergency lubrication and cooling
- ☐ (d) decrease lube oil pressure to the bearing

*If choice a is selected set score to 1.*

**405.** (3.8.10.1-1) While a vessel is underway the low pressure turbine high-speed pinion is damaged. The pinion is then removed from the gear train. Under these circumstances, the main unit is capable of which speed and direction?

- (a) Reduced speed ahead only
- (b) Reduced speed astern and full speed ahead
- (c) Reduced speed astern only
- (d) Reduced speed ahead and full speed astern

*If choice a is selected set score to 1.*

**406.** (3.8.10.2-1) What is the FIRST thing that will happen if both the main and standby lube oil pumps fail on a geared main propulsion turbine operating at full sea speed?

- (a) Ahead throttle will close.
- (b) Lube oil sump will overflow.
- (c) HP turbine bearings will overheat.
- (d) Vacuum will be lost.

*If choice a is selected set score to 1.*